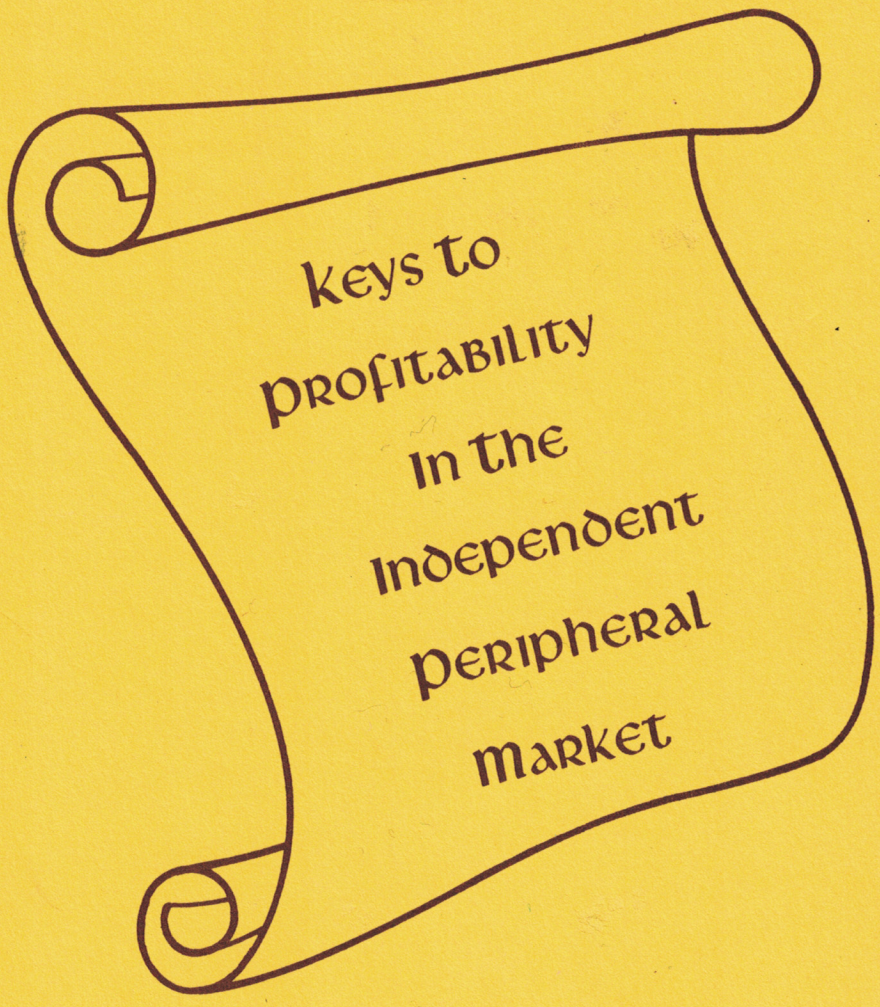

IDC
INTERNATIONAL DATA CORPORATION

KEYS TO PROFITABILITY IN THE INDEPENDENT PERIPHERAL MARKET

A Research Report Prepared for IDC

Continuous Information Services Clients

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International Data Corporation
214 Third Avenue
Waltham, Massachusetts 02154

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Methodology

KEYS is solely concerned with the independent peripheral industry and its member manufacturers (defined in the next section). Of the 175 firms in this industry, IDC has identified the 80 largest revenue earners (generally $10 million or more in 1976/77 revenues). IDC attempted to achieve a consistent measure of profitability and financial performance for all the firms studied.

As a first step, IDC designed "study years" for the report. The yearend financial statement for each company considered had to fall between May 1, 1976 and April 30, 1977 to represent current data. Likewise, for comparison purposes, May 1, 1975 to April 30, 1976 was used as the previous "study year". As such, some dissimilarities with last years KEYS will be noted because of this change in treatment of fiscal time periods.

- For companies who operate exclusively in the peripherals business, we use the "bottom lines" of their annual reports to determine fiscal 1976/77 revenues and profits (after taxes, before extraordinary items).

- For companies who operate in other (nonperipheral) businesses, we use 10K reports to obtain just the peripheral related revenue and profit figures for 1976/77.

IDC's second step was to decide to include in the report all companies with revenue for the "study years" that approached $10M or over. The word "approached" is used as companies IDC felt would pass the $10M mark in 1977 were included in this years report. For 48 of the 80 revenue leaders, the necessary financial data was available. Unfortunately, our desire to present fair and accurate data made it impossible to include companies whose annual report and/or 10K did not allow the peripheral related portion of both revenues and profits to be calculated. Raytheon and General Instrument were two such companies.

As a third step, IDC decided to carry the financial analysis one step further than last year and develop typical ratio figures for the independent peripheral industry as a whole. The ratios calculated were chosen as further measures of a company's financial performance, stability, and liquidity. Three figures were selected as being statistically representative of all concerns within the industry.

Before proceeding with the presentation of the specific tables giving the company names, revenues, and profit for the study period, a full understanding of all financial terms and calculations to be presented is necessary. The terminology that will be used throughout the report is discussed below as well as the purpose of the different ratios to be shown.

Financial Terminology

REVENUE is the total amount of money that the firm received from its operations during that fiscal year. Normally, it is the top line of the company's annual report and could be labeled either sales or revenue.

NET PROFIT is the amount of money that the company earned from its operations after taxes but before extraordinary items.

TANGIBLE NET WORTH is the equity of the stockholders in the business, and is obtained by subtracting total liabilities from total assets, and then deducting intangibles such as goodwill. It is also known as stockholders' equity.

CURRENT ASSETS is the sum of cash, notes and accounts receivable (less reserves for bad debt), advances on merchandise, merchandise inventories, and listed, Federal, State, and Municipal securities not in excess of market value.

CURRENT DEBT is the total of all liabilities falling due within one year.

Ratios To Be Calculated

% PROFIT. Obtained by dividing Net Profit by Revenue. It is a basic yardstick of profitability.

NET PROFIT/TANGIBLE NET WORTH. Obtained by dividing Net Profit by Tangible Net Worth. Generally, a relationship of at least 10 percent is regarded as desirable, but an attempt will be made to determine what the "norm" is within the computer peripheral industry. The percent calculated represents the % of dollars available for providing dividends plus funds for future growth.

CURRENT ASSETS/CURRENT DEBT. Obtained by dividing Current Assets by Current Debt, its purpose is to determine how solvent the company is. Can it meet its short-term obligations?

NET SALES/INVENTORY. Obtained by dividing annual Revenue by Inventory as carried on the balance sheet. This is not an actual physical turnover but a means of comparing stock to sales ratios of one concern with another or with those for the industry.

WEIGHTED AVERAGE. Obtained by adding individual company revenues to get total revenue and all net profits to get total profits. Then, dividing total profit by total revenue. This measure applies to overall profitability of a group and not to an individual company's performance.

Ranges of profitability used in the presentation are:

High profitability -- greater than 10% profit margin

Medium profitability -- greater than 5% profit margin

Low profitability -- less than 5% profit margin

Unprofitability -- operating at a loss

This year's report will carry the analysis of the revenues one step further by calculating the ratios previously indicated for the purposes stated. The end result of these calculations is the development of typical ratio figures for the peripheral industry firms as a whole. Three figures will be chosen to give indicators of experience of all firms participating. For instance, a median will be calculated for each ratio noted. Median is the middle figure for a list of figures. Then, an upper quartile and lower quartile figure will also be shown. Upper quartile will be the figure that appears halfway between the median and the top of the series; lower quartile is the number halfway between the median and the bottom of the series. Statistically, each median is the typical ratio figure for all concerns within that line. The upper and lower quartile figures typify the experience of firms in the top and bottom halves of the sample.

Definitions

For the sake of this report, a "peripheral" is any machine used in conjunction with (related to) a central processing unit but not necessarily attached to such unit. Thus -- by our definition -- "peripherals" include terminals, off-line data entry equipment, and memory (i.e., core memory systems or subsystems, not components) as well as those devices commonly identified as peripherals like disk drives, tape drives, line printers, etc.

This explains "independent" and "peripheral," but even the innocuous term "manufacturing" involves complications and requires definition. The latter term is loosely applied in this report, referring to true manufacturers as well as to key-to-disk suppliers who buy units on an OEM basis and merely do some interfacing and assembly. The key-to-disk "manufacturer" does not engage in the actual manufacturing process but he "builds" systems and is therefore included in this study. Systems houses, on the other hand, are not included since the addition of software is their main function.

- Itel and similar companies (leasing operations) are not included. However, some companies that we have included (e.g., Telex) make certain peripherals and buy others on an OEM basis for resale. We could not separate these revenue sources, so both are included.

"Product area" is a term used throughout the report in reference to various peripheral product areas with common characteristics, namely:

- Keyboard Equipment (data entry, operator-oriented terminal products)
- Disk/Tape Drives
- Memory Equipment (core memory systems, add-on memory)
- Printers
- Interconnect Equipment (modems, multiplexors, communications controllers)

- Autotransaction Equipment (automated tellers, credit card reading terminals)
- Graphics Equipment (plotters, COM, graphic displays)
- Remote-Batch Terminals
- Character Recognition Equipment (OCR, MICR)
- Other (card I/O, paper tape)

A company will be classified as a "single product area company" if all of its products belong to one of the major groups listed above, even though the company may have a broad range of actual products within that group.

The revenue figures and total market estimates presented in this report are based on worldwide sales by U.S. peripheral manufacturers.

THE INDEPENDENT PERIPHERAL MANUFACTURING INDUSTRY - YESTERDAY

The independent peripherals business is a long-time member of the EDP industry. Between 1960 and 1967 the mainframe manufacturers -- with the exception of IBM -- relied on independent suppliers for most of their peripherals. Even IBM purchased some specialized peripherals from independents (e.g., plotters from CalComp; MICR from Lundy). Also, independents supplied certain specialized peripherals to end users -- plotters, OCR, head-per-track disk files -- although each represented a relatively small market.

In 1968 the plug-compatible idea set in and the far-reaching PCM push started. Tape drive and disk drive markets felt the initial PCM impact, later followed by plug-compatible terminals, memory, printers, and communication controllers. A new turn of events saw the OEM market dwindle as mainframe producers stepped up their in-house peripheral production, and another market take shape as the minicomputer emerged -- and with it systems houses and "miniperipheral" markets.

The independent peripheral market expanded further as major end-user products generated new business. Makers of key-to-disk, intelligent terminals, and batch terminal systems have made a twofold revenue contribution to the peripheral market: their own peripheral offerings have boosted the revenue total, and they have fostered considerable OEM revenues for other independent peripheral suppliers, both standard and specialized. At that turning point in 1968, IDC estimated the total independent peripheral supplier revenues to be $300-$350 million. Today that revenue has grown to $4 billion, as illustrated in Figure 1.

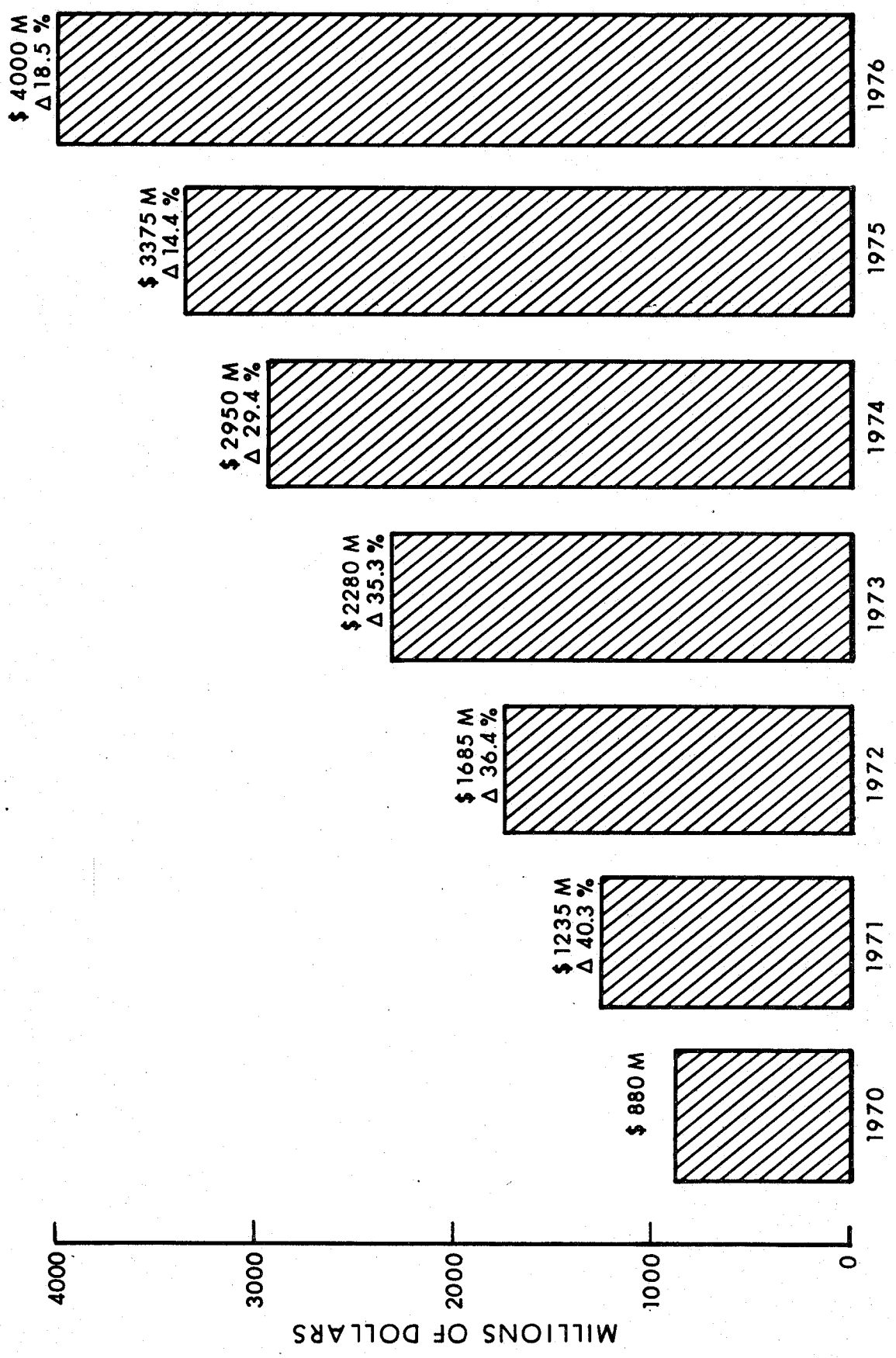


Figure 1 INDEPENDENT PERIPHERAL MARKET TOTAL REVENUE GROWTH 1970-1976

THE INDEPENDENT PERIPHERAL INDUSTRY-TODAY

The $4,000 million in revenues for the 1976/77 study year is believed by IDC to be spread among 175 independent peripheral industry firms. This year found the top seven contributing about one-third of total industry revenues. (Complete list on next page.) Total firms in the industry are declining as larger companies acquire smaller more specialized firms. At the same time, more firms are moving into the "middle-class" i.e., $10M and up range.

TABLE 1

INDEPENDENT PERIPHERAL MARKET 1976/77 REVENUE BREAKOUT

Revenues of Organizations	# of Organizations	Total Revenues
>$100 million	7	$1,255 million
$40 - $100 million	24	$1,455 million
$10 - $40 million	49	$920 million
$1 - $10 million	95	$370 million
Average $22.9 million	175	$4,000 million

FIGURE 2

THE "$100 MILLION OR MORE" FIRMS
INDEPENDENT PERIPHERAL-RELATED REVENUES

Company	Revenues
Control Data Corporation	$417 million
Memorex	$211 million
Mohawk	$146 million
Calcomp	$122 million
Data 100	$122 million
Storage Technology	$122 million
Dataproducts	$115 million
TOTAL	$1,255 million

The profit parameters used in this years report have also been used to categorize companies in the report based on their previous years' profit to detect movement between profit parameters. The overwhelming pattern of profit change was upward in all but four cases. The following listing identifies those companies that changed groups as a result of their 1976/77 performance.

FIGURE 3

COMPANIES WHICH CHANGED GROUPS

		Profit Ranking Last Year	Profit Ranking Current Year
Climbed:	Dataproducts	Medium	High
	Data Terminal Systems	Medium	High
	Shugart Associates	Medium	High
	Compuscan	Medium	High
	Memorex	Low	Medium
	CCI	Low	Medium
	Tally	Low	Medium
	AMS	Low	Medium
	REI	Low	Medium
	Comten	Low	Medium
	EM & M	Loss	Medium
	MSI	Loss	Medium
Dropped:	Milgo	High	Medium
	Datum	Low	Loss
	General Computer	Low	Loss
	Scan Data	Low	Loss

1977 PROFITABILITY ANALYSIS

Revenue Leaders

The revenue and profit totals for the 48 leading independent peripheral manufacturers is presented in Table 2. Both "study years" have been included for comparison purposes i.e. 5/1/75 - 4/30/76 as last year and 5/1/76 - 4/30/77 as this year. The table is arranged to show the profitability of each firm as measured by a % profit figure, which is calculated by taking the net profit after taxes figure and dividing by the revenue figure for the same fiscal period.

IDC arbitrarily selected the following four ranges:

High profitability -- greater than 10% profit margin

Medium profitability -- greater than 5% profit margin

Low profitability -- less than 5% profit margin

Unprofitable -- operating at a loss

Table 2 also identifies the major product of each company and indicates in the extreme right column whether the company shown is also considered an "Interconnect", "PCM", or "Single Product OEM" company. This should help spot the leading and losing product sectors rapidly.

Overall, the revenues for independent peripheral suppliers increased 18.4% during the latest fiscal year while profit dollars increased 69.5%. The overall weighted profitability in 1975 was 4.2% as opposed to 1977s 6.0%. This group summary of profit figures and percentages is somewhat overstated since those companies who operated in the red were calculated not as negatives, but as 0.0% profit.

Specifically, Table 2 shows:

- Full commitment to peripherals as your livelihood as well as being a single product OEM manufacturer seem to be the prerequisites for being in the top echelon of percent profitability in 1976/77. Most of the top participants are single product OEM. And not one firm whose revenues were apportioned made the top group.

TABLE 2

ANALYSIS OF INDEPENDENT PERIPHERAL MANUFACTURING LEADERS
Fiscal Years Between 5/1/76-4/30/77

	Fiscal Years	Last Year ($M) 1975/76 Revenues	Last Year ($M) 1975/76 Profit	Last Year % Profit	Current Year ($M) 1976/77 Revenues	Current Year ($M) 1976/77 Profit	Current Year % Profit	Major Product	Single Product OEM	Inter-connect	PCM
High Profitability Firms											
Applied Digital Data Sys. (ADDS)	11/30/75 & 76	$ 17.8M	$ 3.2M	18.0%	$ 23.4M	$ 4.6M	19.7%	CRTs	x		
Centronics Data Computer	6/30/75 & 76	41.5	7.3	17.6	52.2	9.8	18.8	Printers	x		
Information International	4/30/76 & 77	15.0	1.7	11.3	15.1	2.0	13.2	COM			
Codex	9/30/75 & 76	26.2	4.4	16.8	27.2	3.3	12.1	Interconnect Equipment		x	
Data Terminal Systems	11/31/76 & 77	11.1	1.0	9.0	20.4	2.4	11.8	ECR/POS			
Shugart Associates	4/30/76 & 77	9.2	0.9	9.8	18.1	2.0	11.0	Floppy Disk	x		
Documation	1/30/76 & 77	13.7	1.9	13.9	18.6	2.0	10.8	Card Reader/ Printer	x		
Compuscan	5/30/75 & 76	11.1	1.0	9.0	13.1	1.4	10.7	OCR			
Dataproducts	3/26/76 & 77	85.1	7.1	8.3	115.3	12.2	10.6	Printers/Core Memory			
Medium Profitability Firms											
Electronic Memories & Magnetics*	12/25/75 & 76	58.1	(Loss)	-	52.2	4.5	8.6	Core Memory/ Disk Drives			x
Memorex*	12/31/75 & 76	156.3	7.0	4.5	210.4	18.1	8.6	Disk Drives/ Terminals			x
MSI Data	3/27/76 & 77	31.2	(Loss)	-	34.3	2.8	8.2	Portable Data Entry			
Datapoint	7/31/75 & 76	46.9	3.1	6.6	72.1	5.9	8.2	Intelligent Terminals			
Penril	7/31/75 & 76	4.3	0.4	9.3	7.5	0.6	8.0	Interconnect Equip-ment		x	
Sycor	12/31/75 & 76	54.8	5.1	9.3	67.2	5.2	7.7	Intelligent Terminals			
Computer Communications	6/30/75 & 76	4.5	neg.	0.2	8.2	0.6	7.3	Interconnect Equip-ment/Terminals		x	
Courier Terminal Systems*	12/31/75 & 76	18.6	0.8	4.3	39.7	2.8	7.1	CRTs			x
Data Card	3/27/76 & 77	14.6	1.2	8.2	21.0	1.5	7.1	Credit Card Embossing			
Tally	12/28/75 & 76	21.5	0.6	2.8	27.0	1.9	7.0	Paper Tape Equip-ment/Printers			
Four-Phase Systems	12/31/75 & 76	50.2	1.6	3.2	63.2	4.4	7.0	Intelligent Terminals			
Advanced Memory Systems	9/26/75 & 76	32.0	1.2	3.8	40.3	2.6	6.5	Add-On Memory			x
Beehive International	9/30/75 & 76	9.7	0.5	5.2	12.6	0.8	6.3	CRTs			

*Apportioned by IDC to reflect only peripheral related portion of company revenues.

TABLE 2: ANALYSIS OF INDEPENDENT PERIPHERAL MANUFACTURING LEADERS
Fiscal Years Between 5/1/76-4/30/77 (Continued)

	Fiscal Years	Last Year ($M) 1975/76 Revenues	Last Year ($M) 1975/76 Profit	Last Year % Profit	Current Year ($M) 1976/77 Revenues	Current Year ($M) 1976/77 Profit	Current Year % Profit	Major Product	Single Product OEM	Inter-connect	PCM
Storage Technology	12/31/75 & 76	$ 98.8M	$ 5.9M	6.0%	$ 121.8M	7.6	6.2	Tape Drives			x
Incoterm	2/28/76 & 77	32.7	2.2	6.7	39.8	2.5	6.2	Intelligent Terminals			
Milgo Electronic	9/30/75 & 76	40.6	4.2	10.3	41.0	2.4	5.9	Interconnect Equipment		x	
Recognition Equipment	10/31/75 & 76	59.3	2.2	3.7	65.3	3.5	5.4	OCR			
Andersen-Jacobson	3/31/76 & 77	17.3	0.9	5.2	20.9	1.1	5.3	Interconnect Equip-ment/Terminals			
Comten*	12/31/75 & 76	15.0	0.5	3.3	23.3	1.2	5.2	Interconnect Equipment		x	
Low Profitability Firms											
Pertec*	3/27/76 & 77	88.3	(Loss)	-	94.5	4.7	4.9	Tape Drive/Disk Drives/Shared Pro-cessors			
Gerber Scientific Instr.	4/30/76 & 77	14.5	(Loss)	-	20.8	1.0	4.8	Plotters			
Data 100	12/31/75 & 76	95.9	4.2	4.4	122.0	4.7	3.9	Remote-Batch Terminals/Disk Drives/Printers			
ECRM	12/31/75 & 76	5.1	(Loss)	-	7.8	0.3	3.8	OCR			
Inforex	12/28/76 & 77	57.0	1.2	2.1	63.0	2.2	3.5	Key-to-Disk			
Quantor	7/31/75 & 76	13.2	0.4	3.0	16.8	0.5	3.0	COM			
Docutel	12/31/75 & 76	27.2	0.6	2.2	31.3	0.9	2.9	Autotellers			
Hazeltine*	12/31/75 & 76	19.9	(Loss)	-	28.2	0.7	2.5	CRTs			
Entrex	12/31/75 & 76	21.0	0.2	1.0	26.5	0.6	2.3	Key-to-Disk			
Mohawk Data Sciences*	4/30/76 & 77	161.7	2.1	1.3	146.1	2.7	1.8	Key-to-Tape/Key-to-Disk/Terminals			
Telex Computer Products*	3/31/76 & 77	74.6	1.1	1.5	82.3	1.4	1.7	Tape Drives/ Disk Drives			x
Delta Data Systems	3/31/76 & 77	6.9	0.3	4.3	8.5	0.1	1.2	CRTs			
General DataComm. Industries	9/30/75 & 76	13.1	Neg.	Neg.	16.0	0.1	1.0	Interconnect Equipment		x	
Decision Data Computer	11/27/75 & 76	39.7	(Loss)	-	34.2	0.2	1.0	Keypunches			

*Apportioned by IDC to reflect only peripheral related portion of revenues.

TABLE 2: ANALYSIS OF INDEPENDENT PERIPHERAL MANUFACTURING LEADERS
Fiscal Years Between 5/1/76-4/30/77 (Continued)

	Fiscal Years	Last Year ($M) 1975/76 Revenues	($M) 1975/76 Profit	% Profit	Current Year ($M) 1976/77 Revenues	($M) 1976/77 Profit	% Profit	Major Product	Single Product OEM	Inter-connect	PCM
Unprofitable Firms											
California Computer Products	6/30/75 & 76	$ 122.9M	(Loss)	-	$ 122.0M	(Loss)	-	Disk Drives/ Plotters			x
Datum, Inc.	12/31/75 & 76	13.5	Neg.	Neg.	13.7	(Loss)	-	Disk Drives	x		
General Computer Systems	6/30/75 & 76	12.5	$ 0.4M	3.2%	9.5	(Loss)	-	Key-to-Disk			
Lundy Elect. & Syst.*	6/30/75 & 76	9.4	(Loss)	-	12.6	(Loss)	-	MICR			
Sanders Associates*	7/30/75 & 76	25.3	(Loss)	-	27.9	(Loss)	-	Intelligent Terminals/CRTs			x
Scan Data*	12/31/75 & 76	9.7	0.1	1.0	10.7	(Loss)	-	OCR			
TOTAL (48 Companies)		$ 1,828.5M	$ 76.5M	4.2%	$ 2,165.6M	$129.8M	6.0%				

*Apportioned by IDC to reflect only peripheral related portion of revenues.

- Major profit leaders, not necessarily revenue leaders, are ADDS and Centronics for the third year in a row! Both firms are single product OEM concerns with ADDS manufacturing CRTs and Centronics manufacturing printers.

- Shugart Associates, Documation, and Data Terminal Systems -- all new listings in KEYS this year -- are off to a flying start with membership in the top quarter. Shugart and Documation are both single product OEMs who experienced significant revenue and profit dollar increases in their latest fiscal year.

- Interconnect firms turned in mixed results: profits dropped at Codex while revenues grew. Profits dropped at Milgo while revenues were essentially flat. Comten showed growth in both revenues and profits. CCI (a newcomer to KEYS) reported both increased revenues and profits. Still, on a weighted average basis, this group maintains its second most profitable group rank, as Table 5 shows.

- Plug-Compatible Manufacturers did not make the high profitability range for the third year in a row. EM & M, a PCM, made a fast recovery from a troubled fiscal year, turning in a very respectable 8.6% profitability in 1976, enabling them to lead the list of medium profitability firms.

Tracing Keys Participants

IDC felt it would be worthwhile to put together a list of all firms who have made either a brief or continuing appearance in KEYS. The results of a trace of the KEYS roster since its first publication in June, 1975 are presented in Table 3. Of the 58 companies who are listed:

- 35 firms have made a continued appearance in KEYS. Of those 35, five probably won't make another appearance -- AMS, Codex, Milgo, Sanders, and Shugart have all been acquired by larger firms and their figures will be part of consolidated statements next year.
- 10 firms are making their first appearance in KEYS. Continuous monitoring of the industry allowed us to track them until they reached the $10M mark in revenues.
- 9 firms have left KEYS since the first publication. Only 3 -- Potter, Cambridge Memories, and Optical Scanning -- have left for financial reasons such as bankruptcy. The remaining six all were deleted because of acquisition by another firm that caused their financial data to be put under a consolidated roof.

TABLE 3

KEY'S TO WHO'S WHO'S

Company	Appeared in '74	Appeared in '75	Appeared in '76/77	May Appear '78
Advanced Memory Systems	x	x	x	Merged with Intersil
ADDS	x	x	x	x
Applied Magnetics Corp.	x	Data not broken out	Data not broken out	
Anderson-Jacobson	x	x	x	x
Beehive International	Too small	Too small	x	x
Calcomp	x	x	x	x
Cambridge Memories	x	x	Operating Under Chapter XI	
CCI	Too small	Too small	x	x
Centronics	x	x	x	x
Codex	x	x	x	Acquired by Motorola
Cogar	x	Acquired by Singer		
Compuscan	Too small	x	x	x
Computer Machinery Corporation	x	x	Acquired by Pertec	
Comten	x	x	x	x
Courier	x	x	x	x
Data Card	Consolidated with Dataproducts	Consolidated with Dataproducts	x	x
Data 100 Corporation	x	x	x	x
Data Disc	x	x	Name changed to Amcomp. Acquired by Datapoint	
Data Pathing, Inc.	x	x	Acquired by NCR	
Datapoint Corporation	x	x	x	x
Dataproducts Corporation	x	x	x	x
Data Terminal Systems	Too small	Too small	x	x
Datum	x	x	x	x
Decision Data	x	x	x	x
Delta Data	Too small	Too small	x	x
Documation	Private	Private	x	x
Docutel	x	x	x	x
ECRM	Too small	Too small	x	x
EM & M	x	x	x	x
Entrex	x	x	x	x
Fabritek	x	x	Dropped out as PCM	
Four Phase	Private	x	x	x

TABLE 3: KEY'S TO WHO'S WHO'S - (continued)

Company	Appeared in '74	Appeared in '75	Appeared in '76/77	May Appear '78
General Computer	x	x	x	x
General Data Comm	Too small	Too small	x	x
Gerber Scientific	x	x	x	x
Hazeltine	x	x	x	x
Incoterm	x	x	x	x
Inforex	x	x	x	x
Information International	x	x	x	x
Lundy	x	x	x	x
Memorex	x	x	x	x
Milgo	x	x	x	Acquired by Racal Electronics
Mohawk	x	x	x	x
MSI Data	x	x	x	x
Optical Scanning	x	x	Broken into pieces after Chapter XI	
Penril	Too small	Too small	x	x
Pertec Corporation	x	x	x	x
Potter Instrument	x	Chapter XI		
Quantor	Too small	x	x	x
REI	x	x	x	x
Sanders Associates	x	x	x	Acquired by Harris
Scan Data	x	x	x	x
Shugart Associates	Too small	Too small	x	To be acquired by Xerox
STC	x	x	x	x
Sycor	x	x	x	x
Tally Corporation	x	x	x	x
Telex Computer	x	x	x	x
Wangco	x	x	Acquired by Perkin-Elmer	

Keys to Peripheral Business Ratios

As a new addition to KEYS this year, IDC calculated some additional financial and operating ratios from the figures available in the yearend financial statements of 36 of the 48 companies studied in KEYS. Eleven of the 12 firms excluded were firms for whom peripheral manufacturing was a secondary line; the remaining firm was excluded because the necessary data was not readily available.

Although the following tables in this section will present and discuss the individual ratios, Table 4 shows the three figures that IDC believes to be statistically representative indicators of experience of all firms in the survey. The typical ratio for the industry is the median i.e., the number that falls halfway between the upper and lower figures when arranged in numerical order. The upper quartile is the figure that represents the experience of firms that fall between the median and the upper limit; the lower quartile is the figure that represents the experience of firms that fall between the median and the bottom of the series. As such, Table 4 shows:

- NET PROFITS ON NET SALES median is 6.0% which means that most independent peripheral firms had 6.0% of their sales dollar left after the deduction of all expenses such as manufacturing costs, wages, rent, etc. A company experiencing a 6% profitability can be said to have had a year typical of the industry.

- NET PROFITS ON TANGIBLE NET WORTH median is 14.3% which means that it was the most typical return earned on net capital. Another measure of the income producing ability of the company, the money left over can be used to pay dividends and/or put back into the business to build factories, purchase equipment, and create more jobs.

- CURRENT RATIO median is 2.7:1 which means that for every $2.70 of current assets most peripheral firms typically have $1.00 of current liabilities. The ratio tells how solvent the company is on a day-to-day basis. It could be interpreted to mean that a company could experience shrinkage in its current assets equal to not more than 63% without having serious difficulty in meeting its current obligations. Peripheral firms feeling confident that

TABLE 4

KEY PERIPHERAL BUSINESS RATIOS

	# In Sample	Upper Quartile	Median	Lower Quartile
Net Profits On Net Sales	48	8.2%	6.0%	2.4%
Net Profits On Tangible Net Worth	36	21.4%	14.3%	8.5%
Current Ratio	36	3.3:1	2.7:1	2.0:1
Revenue To Inventory	36	5.0:1	4.0:1	3.3:1
Total Debt/Equity	36	173.0%	95.5%	60.0%

there is a small chance of interruption in the operating cycle may feel at ease with a smaller ratio.

- REVENUE TO INVENTORY median is 4.0:1 which means that the typical sales to stock ratio for the industry is $4.00 of revenue for every dollar of inventory. This figure is not an actual stock turnover figure but merely a yardstick for comparing one firm with another.

- TOTAL DEBT TO TANGIBLE NET WORTH median is 95.5% which means that the percent of equity of the creditors in a typical firm is almost that of the owners or stockholders. Two sides to this ratio should be noted. An increase in debt over equity means that the business is vulnerable to a decline in business and possible inability to meet its obligations. However, it should not be forgotten that it is often advantageous to supplement funds invested by stockholders with a certain amount of funds invested by other sources. It is assumed that the additional earnings accruing to the business through the use of borrowed funds will exceed interest charges, which should allow the stockholders an increase in rate of return (dividends).

Profitability of General Marketing Approaches

To add further substance to the facts and figures shown in Table 2, IDC categorized the 48 firms shown according to their marketing approach. Each firm was assigned to one of the following groups:

A. Companies that sell in one product area on an OEM basis, i.e., they sell to a firm who will incorporate the peripheral hardware into a package they sell to end users;

B. Companies that sell one unique (not an IBM equivalent machine) nonkeyboard machine i.e., hardware that doesn't incorporate a pad similar to a typewriter into its design.

C. Companies that sell one unique keyboard-oriented product to end users.

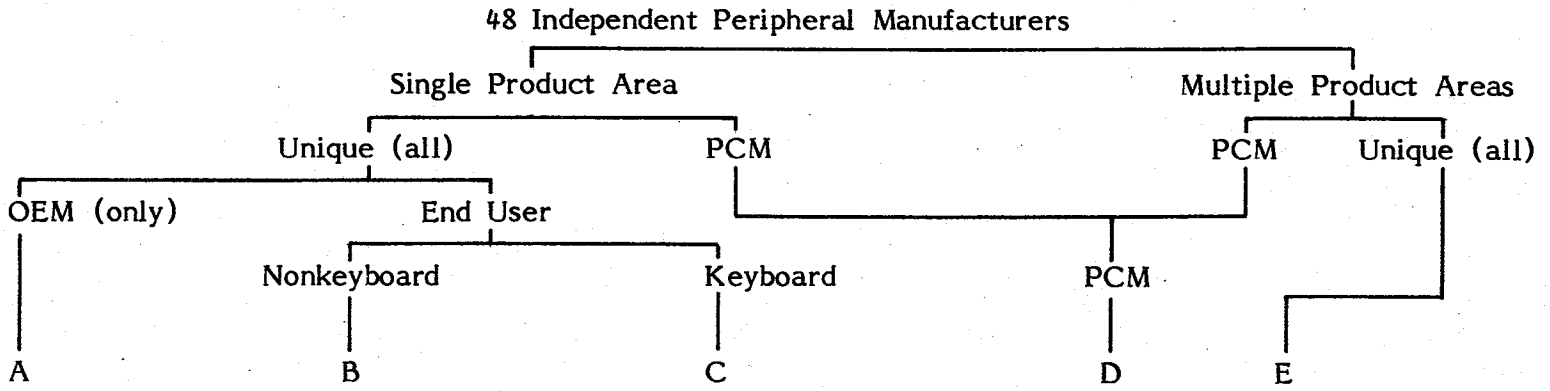
D. Companies that sell plug-compatible products i.e., the peripheral can be used in lieu of IBM's product without necessitating any software adjustments, with the switch transparent to the system.

E. Companies that sell multiple unique products.

Figure 4 demonstrates in a graphic manner how a company's product and customer market determined its group assignment. It should be noted that so many of the firms fit into the single unique end user product area that we divided it still further -- into keyboard and nonkeyboard manufacturers.

FIGURE 4

CLASSIFICATION SCHEME FOR PERIPHERAL MANUFACTURERS



A	B	C	D	E
ADDS	Info. Int'l.	Data Terminal Systems	EM&M	Dataproducts
Centronics	Codex	MSI Data	Memorex	Tally
Shugart Associates	Compuscan	Datapoint	Courier	CCI
Documation	Data Card	Sycor	AMS	Pertec
Datum	Penril	Four Phase	STC	Anderson Jacobson
	Milgo	Beehive Int'l.	Telex	Data 100
	REI	Incoterm	Calcomp	Mohawk
	Comten	Inforex	Sanders	
	Gerber Scientific	Hazeltine		
	ECRM	Entrex		
	Quantor	Delta Data Systems		
	Docutel	Decision Data		
	Lundy	General Computer		
	General Data Comm			
	Scan Data			

Before launching into a discussion of how each specific company within each marketing approach fared in 1976/77, it would be helpful to examine the performance of each group as represented by their weighted average of profitability. As such, Table 5 shows:

- Unique not keyboard products experiencing a drop in their weighted average from 6.0% to 5.7%.
- PCM's move out of last place, registering the most significant improvement of any group.

TABLE 5

WEIGHTED % PROFIT BY MARKETING APPROACH

	Current Year	Last Year
OEM	14.6%	13.9%
Unique Not Keyboard	5.7	6.0
Unique Keyboard	5.8	4.0
Unique Multiproduct	5.2	3.1
PCM	5.3	2.7
TOTAL	6.0%	4.2%

Group A

Companies that sell in one product area on an OEM basis showed figures that either placed them in the highest profitability range or in the loss range. Revenues increased 31% with profits increasing 38% for the group as a whole. Table 6 highlights:

- Glowing performances for ADDS and Centronics, as they lead the entire peripheral industry in profitability performance as measured by their % Profit figures. With the median for the industry being 6.0%, their figures assume even higher significance when their other ratios are examined. Stockholders for these companies must be pleased with the 35.1% and 28.2% rates of return on net capital that are well above even the upper quartile boundary for the industry overall. Conservatism can be seen in their retention of a large amount of current assets in relationship to their current debt. Backing their current conservatism is also their slight reliance upon borrowed funds as a source of additional funds as demonstrated by their 24.4% and 27.5% Total Debt/Equity figures respectively.

- Newcomers Shugart Associates and Documation also have % Profit figures above the industry norm showing an ability to keep expenses to a minimum slice of their sales dollars. The Debt/Equity ratios calculated for them also indicate their conservatism in the use of borrowed funds to supplement invested capital with figures of 78.3% and 65.1% respectively. Shugart at 33.9% is well above even the upper norm for return on net capital while Documation is below the median of 14.3% with 12.8%.

- Datum's fiscal year was the only dark spot on the single product OEM horizon this year with the firm showing a loss that it had appeared to be headed for in last year's report. Datum also shows a Current Ratio well below the norm for the industry that indicates a shrinkage of 38% in current assets could mean difficulty in meeting current obligations. Datum has almost 400% more debt than equity, well above the lower debt/equity limit for the industry. However, the annual report indicates that the company is in the process of revamping its financial obligations to reasonable levels.

TABLE 6

SINGLE-PRODUCT AREA COMPANIES -- OEM
1976/1977 Profitability

Company	Fiscal Year Ended	Presented As: Current Year 1976/77 Revenue	1976/77 Profits	% Profit	% Change From Previous Year	Current Ratio	Times Revenue To Inventory	% Net Profit On Tangible Net Worth	% Total Debt/ Equity
ADDS	11/30/76	$ 23.4M	$ 4.6M	19.7%	+1.7%	4.4:1	7.1:1	35.1%	24.4%
Centronics	6/30/76	52.2	9.8	18.8	+1.2	4.0:1	2.9:1	28.2	27.5
Shugart	4/30/77	18.1	2.0	11.0	+1.2	2.1:1	5.3:1	33.9	78.3
Documation	1/28/77	18.6	2.0	10.8	-3.1	4.1:1	2.0:1	12.8	65.1
Datum	12/31/76	13.7	Loss	-	-	1.6:1	4.6:1	-	381.0
TOTAL		$126.0M	$18.4M	14.6% Weighted Average	+0.7% Weighted Average				
		+31.7%	+38.3%						
(Previous Year Totals)		$ 95.7M	$13.3M	13.9% Weighted Average					

Group B

Companies producing unique not keyboard products for the end user market had the only overall profitability figure for any group that decreased. Of the thirteen companies listed, 8 demonstrated profit improvement during their latest fiscal year (62%). Revenues increased 18.3% and profits increased 11.9% for the group as a whole. Table 7 highlights:

- Codex and Milgo as the prime contributors to the overall drop in profitability experienced by the group as their individual fortunes were dampened in their latest fiscal year. Both experienced negative 4%-5% drops in performance, although Codex had % Profit figures that kept the firm in the upper ranges. While Milgo figures were unavailable, Codex demonstrated very conservative posture in its current ratio with 4X the amount necessary to meet current obligations on hand and in its borrowing with its total debt being only 63.6% of equity.

- Gerber Scientific showed the greatest amount of overall improvement in its % profitability, almost making it into the medium profitability range of 5% with its 4.8% improvement. Its Debt to Equity percentage of 107.3% is slightly above the median for the peripheral group as a whole while its other ratios fall slightly short of the meeting the medians for their individual categories.

- Data Card and ECRM, new members of KEYS, showed mixed results in their respective fortunes. Data Card experienced an increase in dollar revenues and profits while dropping in % profit. This shows an increase in sales volume, at a sacrifice in terms of the percentage of net income, that produced a greater amount of net income. ECRM pulled out of a fiscal down to increase both dollars and percentages in their profit picture.

TABLE 7

COMPANIES MANUFACTURING IN THE UNIQUE NOT KEYBOARD PRODUCT AREA
1976/1977 Profitability

Company	Fiscal Years Ended	Presented As: Current Year 1976/77 Revenues	1976/77 Profits	% Profit	% Change From Previous Year	Current Ratio	Times Revenue To Inventory	% Net Profit On Tangible Net Worth	% Total Debt To Tangible Net Worth
Information International	4/30/77	$ 15.1M	$ 2.0M	13.2%	+1.9%	6.6:1	3.8:1	13.2%	11.3%
Codex	9/30/76	27.2	3.3	12.1	-4.7	4.1:1	2.4:1	17.6	63.6
Compuscan	5/30/76	13.1	1.4	10.7	+1.7	5.4:1	3.5:1	17.2	95.5
Penril Corp.	7/31/76	7.5	0.6	8.0	-1.3	2.2:1	3.9:1	21.4	110.7
Data Card	3/27/77	21.0	1.5	7.1	-1.1	3.0:1	3.4:1	17.0	113.7
Milgo	9/30/76	41.0	2.4	5.9	-4.4	Not Available			
REI	10/31/76	65.3	3.5	5.4	+1.7	2.0:1	5.0:1	8.5	61.0
Comten*	12/31/76	23.3	1.2	5.2	+1.9				
Gerber Scientific	4/30/77	20.8	1.0	4.8	+4.8	2.5:1	3.0:1	11.2	107.3
ECRM	12/31/76	7.8	0.3	3.8	+3.8	3.2:1	3.1:1	7.5	44.4
Quantor	7/31/76	16.8	0.5	3.0	None	2.0:1	4.6:1	100.0	279.3
General Data Comm.	9/30/76	16.0	0.1	1.0	+1.0	3.5:1	2.9:1	2.3	167.4
Docutel	12/31/76	31.3	0.9	2.9	+0.7	9.3:1	3.2:1	4.4	10.8
Lundy*	6/30/76	12.6	Loss	-	-	-	-	-	-
Scan Data*	12/31/76	10.7	Loss	-	-				
GROUP TOTAL		$329.5M	$18.7M	5.7% Weighted Average	-0.3% Weighted Average				
		+18.4%	+12.0%						
(Previous Year Totals)		$278.3M	$16.7M	6.0% Weighted Average					

*Revenues were apportioned to show only peripheral related portion so % Profit could be calculated. However, remaining ratios require figures not obtainable from a consolidated balance sheet.

Group C

Overall profitability among those companies producing unique keyboard products increased 1.8% in the 1976/77 study year with an accompanying increase in revenues for the group of 21.8%. Table 8 shows:

- MSI Data making a dramatic improvement in its profitability pulling out of a 1976 loss for an 8.2% profit improvement in 1977. Their market for portable data entry, grocery chains, whose ordering of modern data collection had been slowed by the recent recession, has picked up with more money available to their customers for capital improvements.

- Delta Data Systems, a newcomer, came close to beating out General Computer for the title of least improved in the profitability department with a negative 3.1% change. And its Net Profit on Tangible Net Worth figure of 4.3% indicates below norm ability to generate return on net capital in its latest fiscal year.

- Decision Data eked out a small profit in 1976, sufficient to pull out of the loss range it had been in in 1975. The company, however, has the questionable distinction of having the highest amount of total debt compared to its tangible net worth, giving its creditors more than 7X the claim of stockholders on assets.

TABLE 8

COMPANIES MANUFACTURING IN THE UNIQUE KEYBOARD PRODUCT AREA
1976/1977 Profitability

Company	Presented As: Fiscal Year Ended:	Current Year 1976/77 Revenues	Current Year 1976/77 Profits	% Profit	% Change From Previous Year	Times Current Ratio	Times Revenue To Inventory	% New Profit On Tangible Net Worth	% Total Debt To Tangible Net Worth
Data Terminal Systems	1/31/77	$ 20.4M	$ 2.4M	11.8%	+2.8%	2.9:1	4.0:1	30.3%	51.2%
MSI Data	3/27/77	34.3	2.8	8.2	+8.2	2.4:1	7.4:1	23.5	60.0
Datapoint	7/31/76	72.1	5.9	8.2	-1.6	3.0:1	4.0:1	13.0	37.7
Sycor	12/31/76	67.2	5.2	7.7	-1.6	3.6:1	4.7:1	13.8	39.1
Four-Phase	12/31/76	63.2	4.4	7.0	+3.8	3.5:1	7.0:1	14.3	122.3
Beehive International	9/30/76	12.6	0.8	6.3	+1.1	1.3:1	2.9:1	25.8	287.7
Incoterm	2/28/77	39.8	2.5	6.2	-0.5	2.4:1	4.7:1	16.9	82.6
Inforex	1/2/77	63.0	2.2	3.5	+1.4	1.0:1	10.0:1	11.1	164.6
Hazeltine*	12/31/76	28.2	0.7	2.5	+2.5	-	-	-	-
Entrex	12/31/76	26.5	0.6	2.3	+1.3	2.2:1	3.4:1	9.3	282.0
Delta Data Systems	3/31/77	8.5	0.1	1.2	-3.1	3.3:1	3.7:1	4.5	145.4
Decision Data	11/27/76	34.2	0.2	1.0	+1.0	1.3:1	4.8:1	4.3	717.0
General Computer	6/30/76	9.5	Loss	-	-3.2	2.6:1	3.3:1	-	408.6
GROUP TOTAL		$479.5M	$27.8M	5.8% Weighted Average	+1.8 Weighted Average				
		+21.8%	+78.2%						
(Previous Year Totals)		$393.6M	$15.6M	4.0% Weighted Average					

*Revenues were apportioned to show only peripheral related portion so % Profit could be calculated. However, remaining ratios require figures not obtainable from a consolidated balance sheet.

Financial Comparisons -- General Marketing Approach

A comparison of the bottom line figures -- by group -- of all 48 companies listed in this year's KEYS yielded some pertinent comments on the overall dollar revenues and profits earned by participants in the independent peripheral marketplace. Table 11 shows:

- Companies that manufacture single unique products on an OEM basis (Group A) are the most successful group in terms of percentage increase in dollar revenues.
- Companies that manufacture plug-compatible products -- Group D -- have the second greatest percentage of firms, 62.5%, turning in their most profitable year to date. And their increased individual profitability led to a 231% increase in dollar profits -- double that of any other group!

TABLE 11

1975/76 VERSUS 1976/77 FINANCIAL PERFORMANCE BY GENERAL MARKETING APPROACH

	% Revenue Increase	% Profit Increase	% Firms More Profitable in This Year	% Firms Losing Money Last Year	% Firms Losing Money This Year
Single Product -- OEM (A)	31.7%	38.3%	60.0%	-	20.0%
Unique Not keyboard (B)	18.3	11.9	46.7	6.7%	13.4
Unique Keyboard (C)	21.8	78.2	61.5	23.0	7.7
Plug-Compatible (D)	18.7	231.0	61.5	37.5	25.0
Multiproduct Non-PCM (E)	12.6	87.2	85.7	14.3	-

Profitability by Company Size

As in last year's report, we again broke out the now 48 participants to determine if the smaller manufacturers are still more profitable than their larger counterparts in the industry. The list was divided into two groups; 27 manufacturers with $25 million or more in revenues in 1976/77 fiscal years and 21 manufacturers with less than $25 million in revenues.

Figure 5 points out that the small manufacturers, 21 this year, are the leaders in profitability for the third year in a row. However, their 1.7% lead from last year has dropped to a 1.2% lead in this latest fiscal comparison. It should be remembered that this figure is based on the 48 KEYS participants and does not take into consideration those 95 smaller firms with less than $10 million in sales, nor other large firms for whom peripheral data was unavailable.

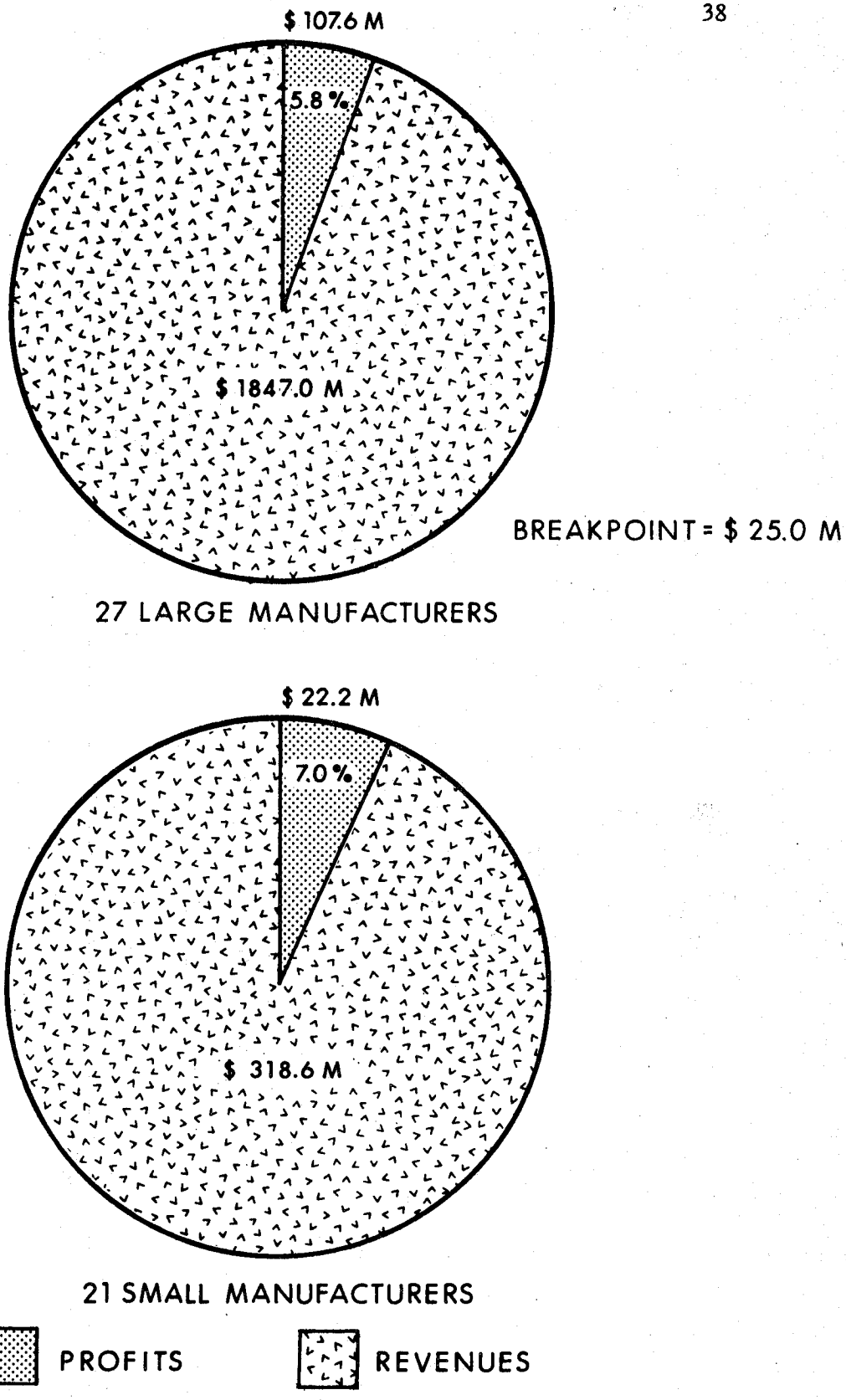


Figure 5 1976 PROFITABILITY OF LARGE vs. SMALL INDEPENDENT PERIPHERAL MANUFACTURERS

Single-Product Versus Multiproduct Profitability

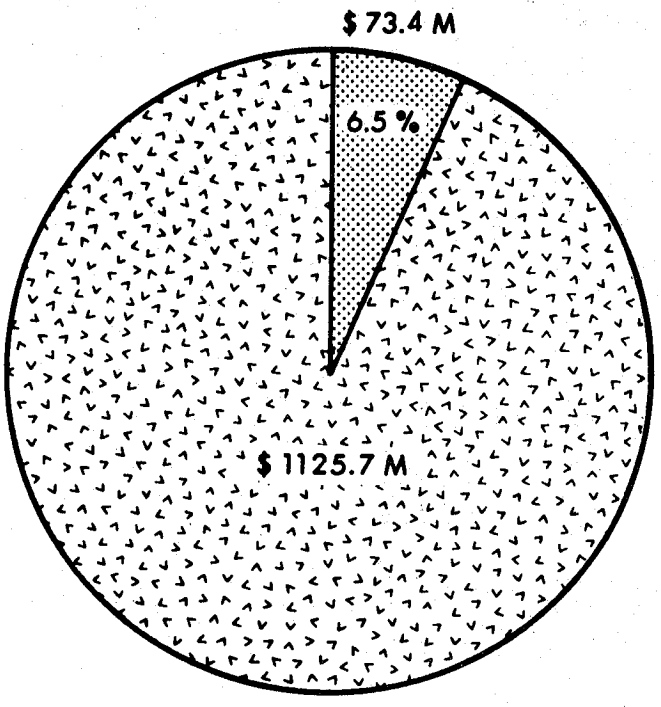
This year's KEYS again breaks out one-product companies versus multiple product companies to see if there is any correlation between breadth of product line and profitability. Figure 6 depicts the breakout of the 48 firms participating in this years KEYS. It shows one product peripheral companies to be outpacing those offering more than one by a 1.1% margin.

Apportioned vs. NonApportioned Companies

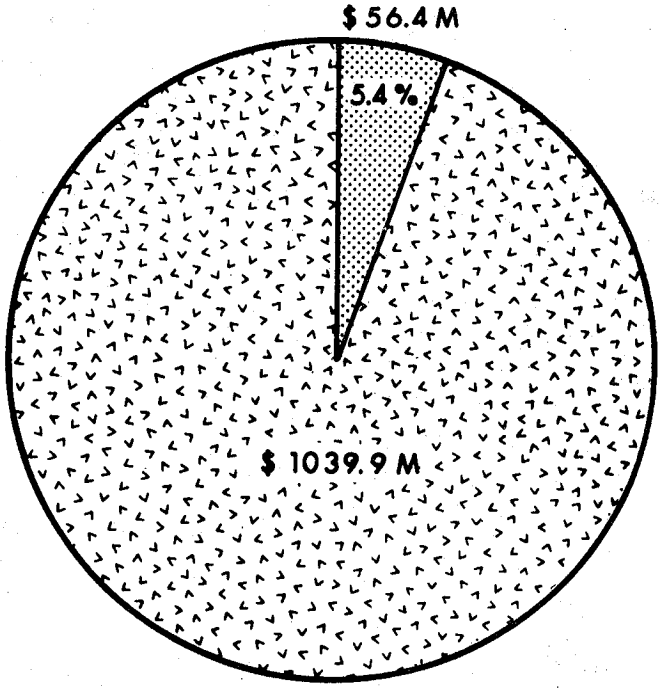
In our overall discussion of the results of this year's survey IDC noted the lack of presence of any apportioned company in what IDC set as the high profitability range. To further illustrate this point, Figure 7 shows revenues and profits for each group highlighting 1.5% margin of difference between firms whose livelihood is only independent peripheral products and those who use them to round out their product line for 1976/77. However, this year's margin is considerably less startling then when a comparison of the two groups on the basis of 1975/76 data is done -- apportioned companies in 1975/76 were 3.6% less in profitability than their competitors.

Principal Product Area for Companies

Figure 8 breaks out the 48 leading independent peripheral manufacturing companies by product area. Only one major product area per company is accounted for.



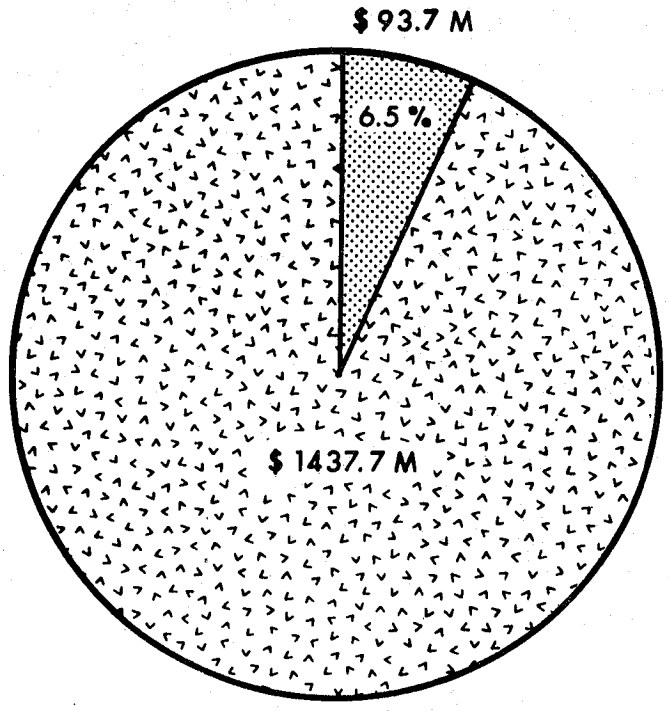
1-PRODUCT COMPANIES (35 FIRMS)



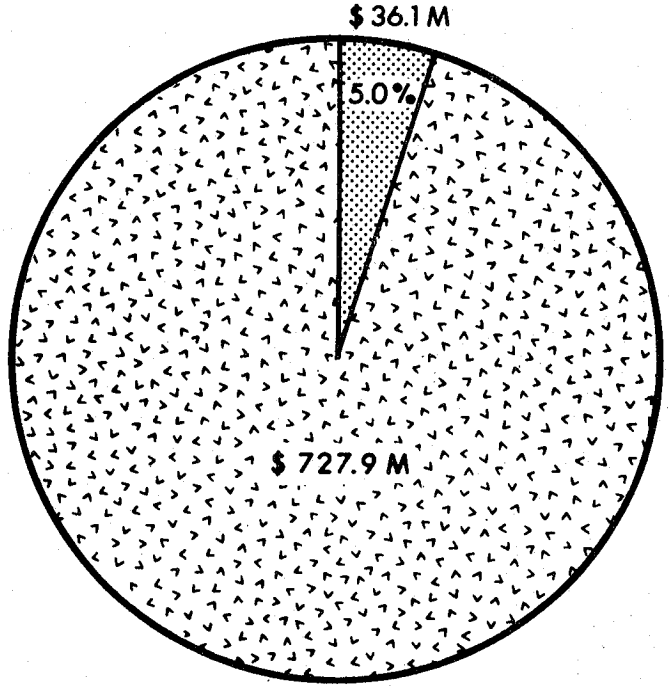
MULTIPRODUCT COMPANIES (13 FIRMS)

PROFITS REVENUES

Figure 6 1976/77 PROFITABILITY OF 1-PRODUCT (AREA) COMPANIES vs. MULTIPRODUCT COMPANIES



NON-APPORTIONED FIRMS (37 COMPANIES)



APPORTIONED FIRMS (11 COMPANIES)

PROFITS REVENUES

Figure 7 1976/77 PROFITABILITY OF APPORTIONED vs. NON-APPORTIONED FIRMS

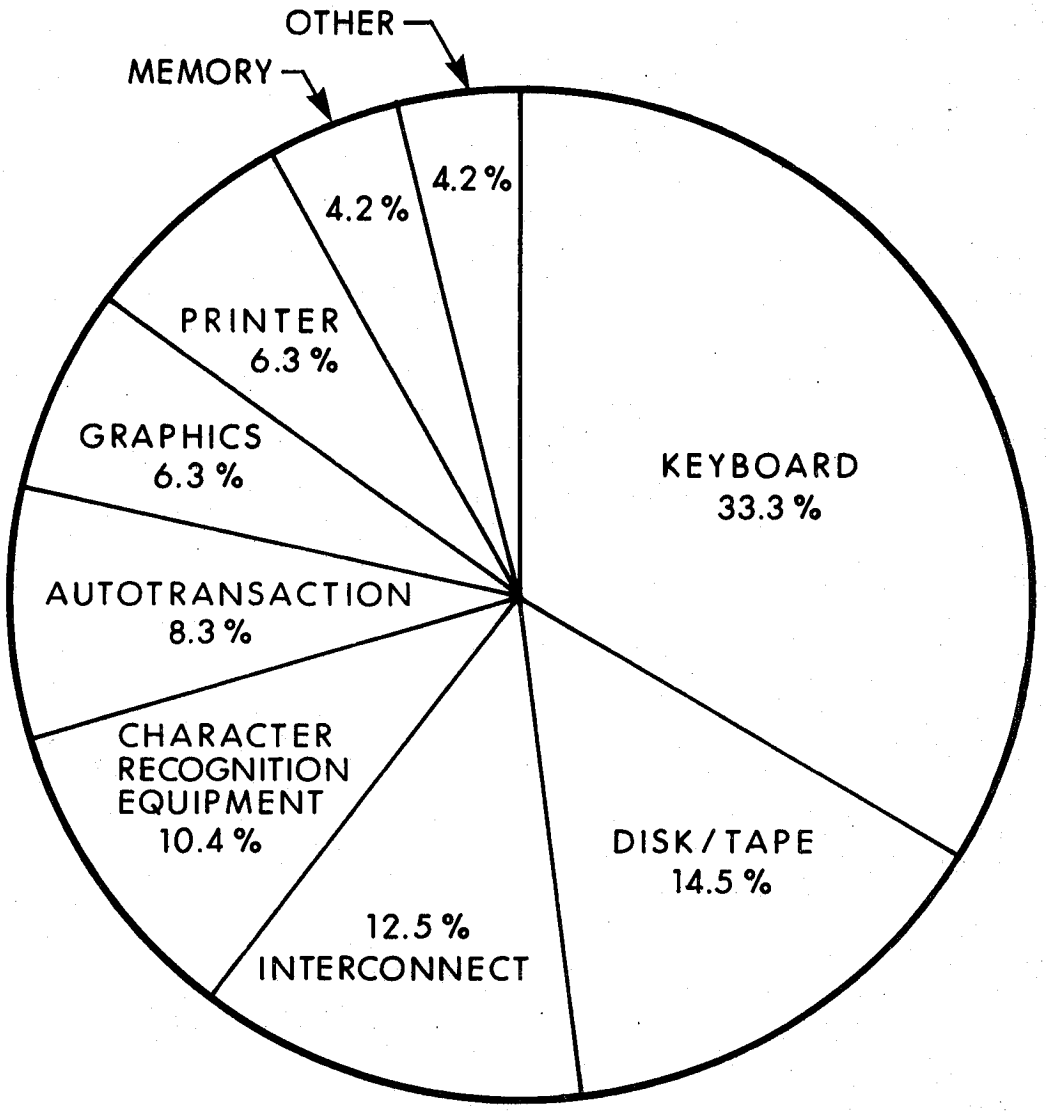


Figure 8 PRINCIPAL PRODUCT AREA BREAKOUT* 48 LEADING INDEPENDENT PERIPHERAL MANUFACTURERS

**Principal Product Area Only*

Profitability by Specific Product Area

We have already analyzed the profitability of general marketing approaches (Groups A-E). This section examines the profitability associated with specific peripheral product areas, namely:

- Keyboard manufacturers
- Disk/tape manufacturers
- Memory manufacturers
- Autotransaction equipment manufacturers
- Interconnect equipment manufacturers
- Printer manufacturers
- Graphics equipment manufacturers
- Character recognition equipment manufacturers
- Other

The following pages discuss the financial performance of the independent peripheral leaders in each of the above groups. A less shortsighted, more historical and long-range discussion of each group will follow in a later section of this report. Forecasts for each product area will be presented at that point.

Keyboard Manufacturers

The manufacture of keyboard products encompasses more firms than any other product area with sixteen of the forty six companies listed in Table 2 receiving the majority of their revenues from these products. Overall, the group showed a 15.3% increase in revenues with an accompanying 56.4% increase in dollar profits. Table 12 illustrates the fiscal performance of all sixteen participants:

- ADDS is the leader for the third year in a row with better than double the % profit figures reported by any of the other participants. Evidently, being the only one of the group that is a single product OEM is a definite marketing plus. Never was the advantage of being a single product OEM demonstrated better!
- With the exception of General Computer, all keypunch manufacturers experienced a rise in profits during their latest fiscal period. However, these products still are not the "hot" items that CRTs and intelligent terminals are in today's market.

Because IDC could not obtain the data necessary for financial calculations, it was impossible to include other major forces in the industry such as Raytheon and Teletype.

TABLE 12

LEADING INDEPENDENT KEYBOARD SUPPLIERS -- 1976/1977

Company	Fiscal Year Ended:	Current Year Revenues	Current Year Profits	Profit	Main Product
ADDS	11/30/76	$ 23.4M	$ 4.6M	19.7%	CRTs
Datapoint	7/31/76	72.1	5.9	8.2	Intelligent Terminals
Sycor	12/31/76	67.2	5.2	7.7	Intelligent Terminals
Courier	12/31/76	39.7	2.8	7.1	CRTs
Four Phase	12/31/76	63.2	4.4	7.0	Intelligent Terminals
Beehive International	9/30/76	12.6	0.8	6.3	CRTs
Incoterm	2/28/77	39.8	2.5	6.2	Intelligent Terminals
Andersen Jacobson	3/31/77	20.9	1.1	5.3	Intelligent Terminals
Inforex	1/2/77	63.0	2.2	3.5	Key-to-Disk
Hazeltine	12/31/76	28.2	0.7	2.5	CRTs
Entrex	12/31/76	26.5	0.6	2.3	Key-to-Disk
Mohawk	4/30/77	146.1	2.7	1.8	Key-to-Disk & Tape
Delta Data	3/31/77	8.5	0.1	1.2	CRTs
Decision Data	11/27/76	34.2	0.2	1.0	Keypunches
General Computer	6/30/76	9.5	Loss	-	Key-to-Disk
Sanders	7/30/76	27.9	Loss	-	CRTs
GROUP TOTAL		$682.8M	$33.8M	5.0% Weighted Average	
		+15.3%	+56.4%		
(Previous Year Totals)		$592.0M	$21.6M	3.6% Weighted Average	

Disk/Tape Manufacturers

The fortune of this group as a whole moved out of its holding pattern of last year when the group experienced a "No Change" status relative to % profitability to achieve an overall 2.5% improvement. Revenues increased 17.6% over the previous years as did profits at 26.8%.

Table 13 shows in more detail:

- Shugart Associates, maker of floppy disks, to be leading the group by a considerable margin. A newcomer to KEYS, Shugart doubled its revenues and profit performance in one fiscal year.
- Memorex also doubled its profits in 1976/77 study year which doubled its % profit margin. Memorex shows an aptitude for keeping a high percentage of the sales dollar after expenses.

The significant participants in the marketplace that we were unable to include are Ampex, CDC, and ISS as profit information was not available in the format needed. Companies included in KEYS who manufacture, as a secondary product, a disk or tape product are, Data 100 (IOMEC), EM & M, and Mohawk.

TABLE 13

LEADING INDEPENDENT DISK/TAPE SUPPLIERS -- 1976/1977

Company	Fiscal Year Ended:	Current Year Revenues	Current Year Profits	% Profits	Main Product
Shugart Associates	4/30/77	$ 18.1M	$ 2.0M	11.0%	Floppy Disk
Memorex	12/31/76	210.4	18.1	8.6	Disk Drives/Terminals
Storage Technology	12/31/76	121.8	7.6	6.2	Tape Drives
Pertec	3/27/77	94.5	4.7	4.9	Tape Drives/Key-to-Tape/Shared Processors
Telex	2/31/77	82.3	1.4	1.7	Tape & Disk Drives
Calcomp	6/30/76	122.0	Loss	-	Disk Drives/Plotters
Datum	12/31/76	13.7	Loss	-	Disk Drives
GROUP TOTAL		$662.8M	$33.8M	5.1% Weighted Average	
		+17.6%	+26.8%		
(Previous Year Totals)		$563.6M	$14.9M	2.6% Weighted Average	

Memory Manufacturers

Only two of the forty-six companies included in this year's KEYS are memory manufacturers. Although any company in this product area is vulnerable to moves made by IBM because of the PCM prerequisite for successful competition, they registered the highest % of improved profitability of any product group, due almost entirely to EM & M's recovery in dollar profits which jumped 591.6%!

TABLE 14

LEADING INDEPENDENT MEMORY SUPPLIERS -- 1976/1977

Company	Fiscal Year Ended:	Current Year Revenues	Current Year Profits	% Profit	Main Product
EM & M	12/31/76	$52.2M	$4.5M	8.6%	Core Memory
Advanced Memory Systems	9/26/76	40.3	2.6	6.5	Add-On Memory
GROUP TOTAL		$92.5M	$7.1M	7.7% Weighted Average	
		+2.7%	+591.0%		
(Previous Year Totals)		$90.1M	$1.2M	1.3% Weighted Average	

Autotransaction Equipment Manufacturers

As Table 15 demonstrates, all the Autotransaction participants made more money, both dollar and on a % basis, in their latest fiscal year. Evidently end users of ECR's, POS, and credit card embossing machines have recovered from the tight budget squeeze brought on by the recession and are looking for the newer methods of data capture.

Table 15 notes:

- Data Terminal Systems, a newcomer to KEYS as the leader in profitability among Autotransaction suppliers. Their 11.8% profit figure also put them in the top quarter range of profitability in the entire industry.
- Profits from credit card embossing put Data Card in our latest KEYS report with a medium profitability figure of 7.1%.

In addition to those listed here, Datapathing is also important in this market.

TABLE 15

LEADING INDEPENDENT AUTOTRANSACTION EQUIPMENT SUPPLIERS 1976/1977

Company	Fiscal Year Ended:	Current Year Revenues	Current Year Profits	% Profit	Main Product
DTS	1/31/77	$ 20.4M	$ 2.4M	11.8%	ECR/POS
MSI	3/27/77	34.3	2.8	8.2	Portable Data Entry
Data Card	3/27/77	21.0	1.5	7.1	Credit Card Embossing
Docutel	12/31/76	31.3	0.9	2.9	Autotellers
GROUP TOTAL		$107.0M	$ 7.6M	7.1% Weighted Average	
		+27.2%	+271.4%		
(Previous Year Totals)		$ 84.1M	$ 2.8M	3.3% Weighted Average	

Interconnect Equipment Manufacturers

There must have been some cracking of profit knuckles in the interconnect arena as this normally high profit group suffered a setback in their climb for high % profit figures during their latest fiscal year. The weighted profitability for the group dropped 2.5% in 1976/77 and dollar profits dropped 13.7%. The performance of Codex and Milgo, although both were still profitable, were the major factors in the groups lowered performance. Both firms were acquired in 1976/1977. It is believed that this area, more than any other, was still emerging from the recession last year and improvement can be expected.

Three other of the 48 firms also compete in this market -- Anderson Jacobson, Memorex, and Dataproducts --but earn most of their revenues in other product lines, as shown in Table 2. Rixon is an example of an independent competitor on which financial data was not available.

TABLE 16

LEADING INDEPENDENT INTERCONNECT EQUIPMENT SUPPLIERS -- 1976/1977

Company	Fiscal Year Ended:	Current Year Revenue	Current Year Profit	% Profit	Main Product
Codex	9/30/76	$ 27.2M	$ 3.3M	12.1%	Interconnect Equipment
Penril	7/31/76	7.5	0.6	8.0	Interconnect Equipment
CCI	6/30/76	8.2	0.6	7.3	Interconnect Equipment
Milgo	9/30/76	41.0	2.4	5.9	Interconnect Equipment
General Data Comm	9/30/76	16.0	0.1	1.0	Interconnect Equipment
Comten	12/31/76	23.3	1.2	5.2	Interconnect Equipment
GROUP TOTAL		$123.2M	$ 8.2M	6.7% Weighted Average	
		+18.8%	-13.7%		
(Previous Year Totals)		$103.7M	$ 9.5M	9.2% Weighted Average	

Printer Manufacturers

All printer manufacturers gleaned more revenue and profit dollars in this latest fiscal year than in previous years! And their overall profitability increased 2.2%. Table 17 shows Centronics to be the leader of the group of three with an 18.8% profit.

TABLE 17

LEADING INDEPENDENT PRINTER SUPPLIERS -- 1976/1977

Company	Fiscal Year Ended:	Current Year Revenue	Current Year Profit	% Profit	Main Product
Centronics	6/30/76	$ 52.2M	$ 9.8M	18.8%	Printers
Dataproducts	3/26/77	115.3	12.2	10.6	Printers
Tally	12/28/76	27.0	1.9	7.0	Printers
GROUP TOTAL		$194.5M	$23.9M	12.3% Weighted Average	
		+31.3%	+59.3%		
(Previous Year Totals)		$148.1M	$15.0M	10.1% Weighted Average	

Graphics Equipment Manufacturers

The overall picture for suppliers of graphics, COM, and plotters improved in this latest year with a weighted average profitability of 6.6%, up 1.6% from the previous years. Revenues increased for the group by 23.4% and dollar profits 66.6%.

Other companies mentioned in Table 2 that produce graphic related equipment as part of their line are Calcomp, Memorex, and Pertec. Figures for Tektronix, another strong competitor, could not be obtained in the format necessary for peripheral apportionment, hence their nonparticipation.

Character Recognition Equipment Manufacturers

Overall, the four OCR firms and the one MICR firm registered a 15.7% increase in dollar revenues while pushing profits up 57.5%! These high dollar increases, however, resulted in only a 1.2% increase in overall weighted profitability for the group. Table 19 highlights the entrance of ECRM in this year's KEYS report. ECRM, the smallest and newest entry in KEYS this year, pulled out of a loss position in 1975 to start a climb in revenues sure to end in over the 10 million dollar mark in 1977.

TABLE 19

LEADING INDEPENDENT MANUFACTURERS OF CHARACTER RECOGNITION EQUIPMENT
1976/1977

Company	Fiscal Year Ended:	Current Year Revenue	Current Year Profits	% Profits	Main Product
Compuscan	5/30/76	$ 13.1M	$ 1.4M	10.7%	OCR
REI	10/31/76	65.3	3.5	5.4	OCR
ECRM	12/31/76	7.8	0.3	3.8	OCR
Lundy	6/30/76	12.6	-	-	MICR
Scan Data	12/31/76	10.7	Loss	-	OCR
GROUP TOTAL		$109.5M	$ 5.2M	4.7% Weighted Average	
		+15.7%	+57.5%		
(Previous Year Totals)		$ 94.6M	$ 3.3M	3.5% Weighted Average	

Manufacturers of Other Products

Only two of the forty-eight entries in this year's KEYS do not fit in any previously mentioned category. It would appear from the dollar figures presented in each individual firms fiscal statements that they both decided to sacrifice an increase in % profit for an absolute dollar increase i.e., while more of the sales dollars went for expenses during the coming year than in previous years, the outlay produced more income than in previous years.

Table 20 shows Documation, a newcomer to KEYS, with a 10.8% profit that still puts them in the high profit range for all firms but that is 2.1% less than last year. And Data 100 slips from 4.4% to 3.9% leaving the firm in the low profitability range.

TABLE 20

LEADING INDEPENDENT MANUFACTURERS OF "OTHER" PERIPHERAL PRODUCTS

Company	Fiscal Year Ended:	Current Year Revenue	Current Year Profit	% Profit	Main Product
Documation	1/31/77	$ 18.6M	$2.0M	10.8%	Card Reader/Printer
Data 100	12/31/76	122.0	4.7	3.9	Remote-Batch Terminals/Disk Drives/Printers
GROUP TOTAL		$140.6M	$6.7M	4.8% Weighted Average	
		+28.2%	+9.8%		
(Previous Year Totals)		$109.6M	$6.1M	5.6% Weighted Average	

TABLE 21

1976/77 VERSUS PREVIOUS YEAR FINANCIAL PERFORMANCE BY SPECIFIC PRODUCT AREA

	% Revenue Increase	% Profit Increase	% Firms More Profitable This Year	% Firms Losing Money Last Year	% Firms Losing Money This Year
Keyboard Mfrs.	15.3%	56.4%	68.7%	12.5%	6.3%
Disk/Tape Mfrs.	17.6	26.8	71.4	28.6	28.6
Memory Mfrs.	2.7	591.6	100.0	50.0	-
Autotransaction Equip. Mfrs.	27.2	271.4	75.0	25.0	-
Interconnect Equip. Mfrs.	18.8	-	40.0	-	-
Printer Mfrs.	31.3	59.3	100.0	-	-
Graphics Equip. Mfrs.	23.4	66.6	67.0	33.0	-
Character Recognition Equip. Mfrs.	15.7	57.5	60.0	40.0	40.0
Other Product Mfrs.	28.2	9.8	-	-	-

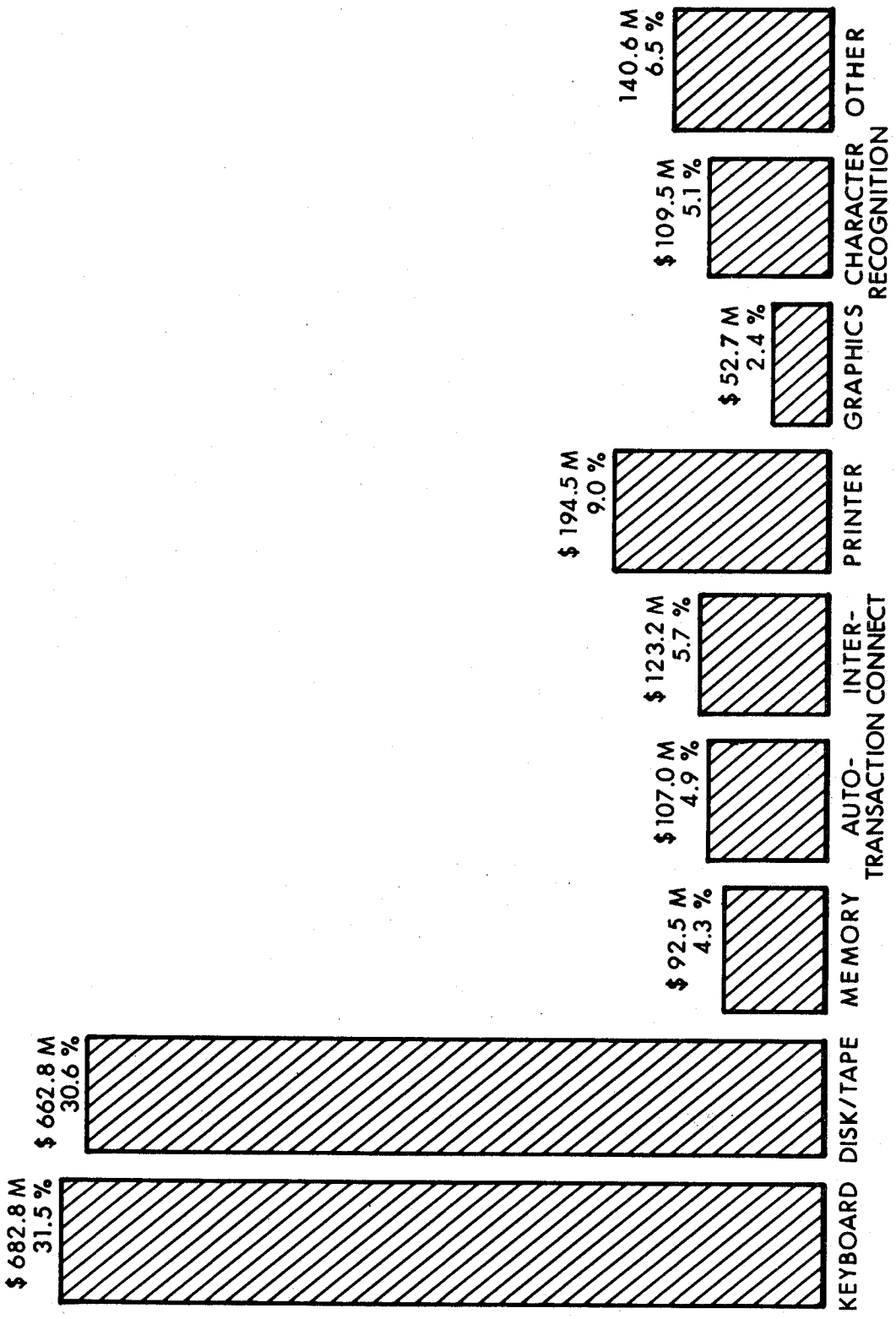


Figure 9 1976/77 REVENUES BY PRODUCT AREA,
48 LEADING INDEPENDENT PERIPHERAL MANUFACTURERS ONLY

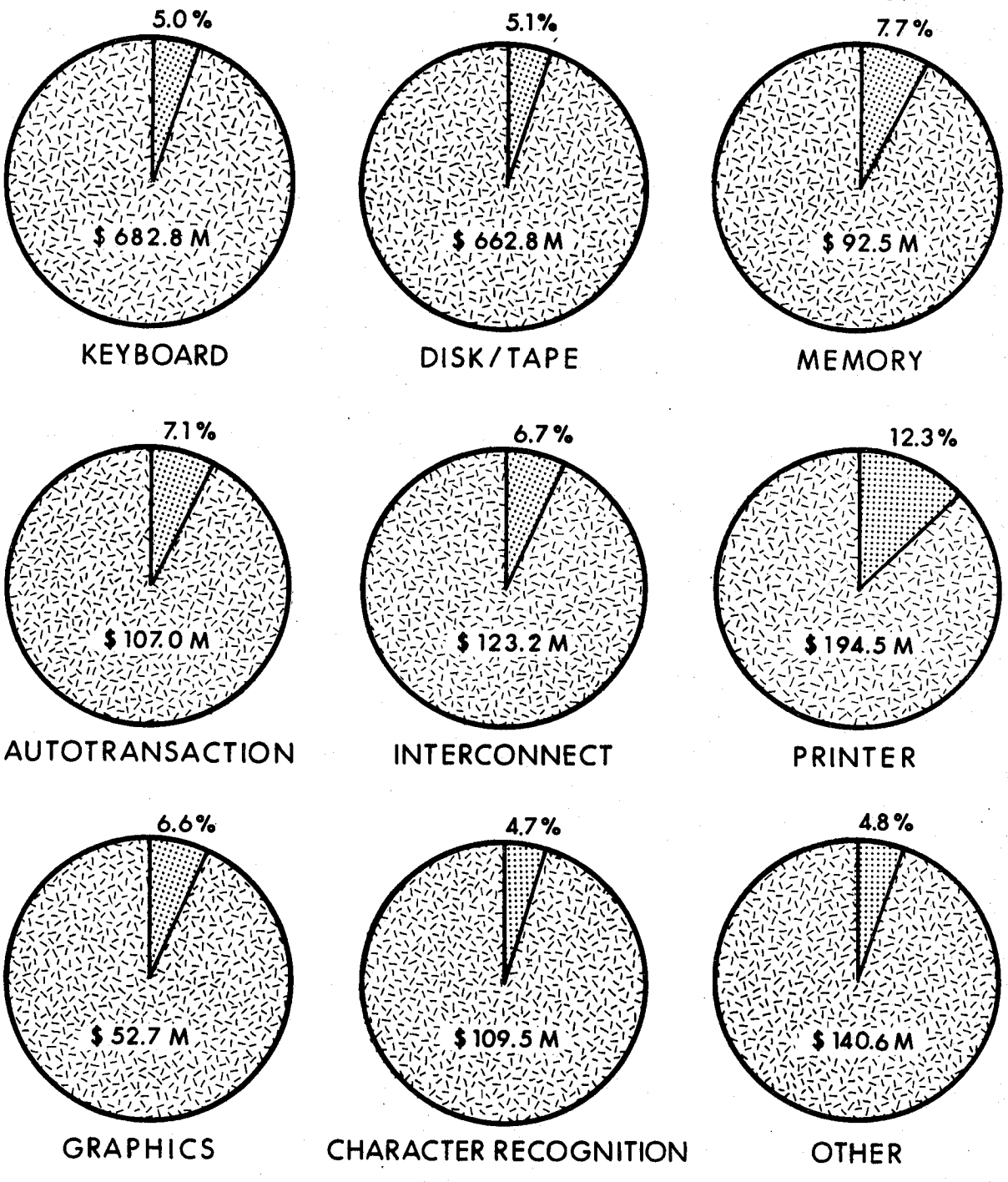


Figure 10 1976/77 INDEPENDENT PERIPHERAL INDUSTRY LEADERS PROFITABILITY BY PRODUCT AREA

INDUSTRY OUTLOOK
1971-1981

PERIPHERAL INDUSTRY MARKETS -- 1971 to 1981

IDC devotes attention each year to measuring the progress of the independent peripheral companies in total. Annually, IDC estimates the total revenue of the industry and projects future market performance. Independent market participants have been defined as those firms who are solely engaged in the manufacture of peripherals, as well as those firms who manufacture and market peripherals completely separate from the systems portion of their business. As such, this section of the report examines:

- Total revenue projections for the industry through 1981, and takes a look at the total picture for OEM manufacturers, PCM manufacturers, and Solutions-Oriented manufacturers.
- Total revenue projections for the industry through 1981 by product sector.

The projections of revenues in this section reflect the ongoing nature of IDC's examination of the independent peripheral marketplace. Occassionally, new facts pertaining to the performance of the marketplace in a year past will cause us to adjust past years figures to reflect our new knowledge. And our assessment of the performance of the marketplace for the year just past relative to expectations or new market conditions may also be reason for IDC to reassess our projections of future market performance.

Revenue Picture Through 1981

IDC expects that revenues for the next five years will grow at an annual compounded rate of 15% with revenues approaching the $10 billion dollar mark in 1981. Figure 11 illustrates expected revenue growth and breaks out the growth curves for the three major contributors. The advanced concepts that have appeared

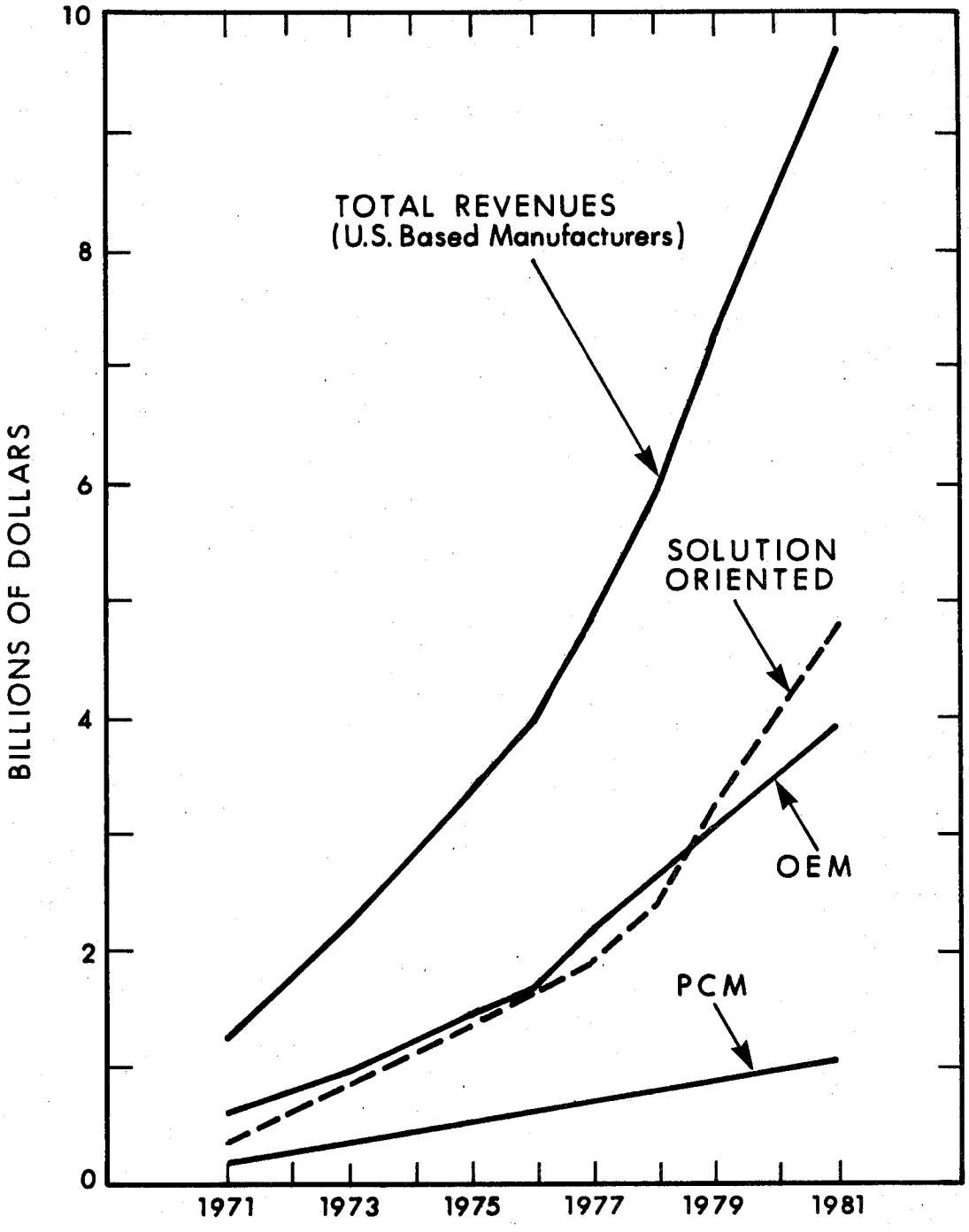


Figure 11 THE INDEPENDENT PERIPHERAL MARKETS

on the horizon in the past several years are starting to be a catalyst for growth in all sectors of the independent marketplace. Distributed data processing, although off to a slower start than previously anticipated, has been put into the planning cycle of larger firms who feel a growing need for processing power at local sites as they update their business practices. Teleprocessing is already well on its way to becoming an accepted way of life at large firms and users are having no trouble justifying additions to their networks of more terminals, memory, etc.

TABLE 22

INDEPENDENT PERIPHERAL MARKET -- REVENUE BREAKOUT

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Total Revenues	$880M	$1,235M	$1,685M	$2,280M	$2,950M	$3,375M	$4,000M	$4,900M	$6,000M	$7,250M	$8,500M	$9,775M
% OEM	64%	53%	43%	44%	44%	43%	43%	45%	45%	43%	41%	40%
OEM Revenues	$563M	$ 655M	$ 725M	$1,003M	$1,298M	$1,451M	$1,720M	$2,205M	$2,700M	$3,117M	$3,485M	$3,910M
%Δ		16%	11%	38%	29%	12%	19%	28%	22%	15%	12%	12%
Total Revenues	$880M	$1,235M	$1,685M	$2,280M	$2,950M	$3,375M	$4,000M	$4,900M	$6,000M	$7,250M	$8,500M	$9,775M
% PCM	13%	18%	17%	17%	17%	16%	16%	15%	14%	13%	12%	11%
PCM Revenues	$114M	$ 222M	$ 286M	$ 388M	$ 501M	$ 540M	$ 640M	$ 735M	$ 840M	$ 943M	$1,020M	$1,075M
%Δ		95%	29%	36%	29%	8%						
Total Revenues	$880M	$1,235M	$1,685M	$2,280M	$2,950M	$3,375M	$4,000M	$4,900M	$6,000M	$7,250M	$8,500M	$9,775M
% Solution Oriented	23%	29%	40%	39%	39%	41%	41%	40%	41%	44%	47%	49%
End User Revenues	$203M	$ 358M	$ 674M	$ 889M	$1,151M	$1,384M	$1,640M	$1,960M	$2,460M	$3,190M	$3,995M	$4,790M
%Δ		76%	88%	32%	29%	20%	18%	20%	26%	30%	25%	20%

OEM Versus End User Revenues and Profits

The OEM sector of the marketplace will continue to contribute an increasing portion of the total dollar revenues of the marketplace in the next five years. IDC's optimism for this market segment is based on the activity expected from the three main sources of OEM revenue:

- The minicomputer industry. Although a few mini manufacturers are producing in-house peripherals, they still look to outside suppliers for help in meeting the demand for peripherals.

- Systems houses. The typical systems house shops around for peripherals and will find in the years to come even more products to choose among. Independents have been busy introducting newer, more sophisticated ways to do things and IDC's surveys indicate a continued trend toward increased purchasing from this customer base.

- Other peripheral suppliers. Primarily terminal manufacturers are in this customer category and it is considered to be one of the most dynamic customer bases in the industry. Although distributed processing has taken longer to "catch" then previously anticipated, primarily because of the lead time necessary for a company to implement the organizational and business applications necessary for smooth transition, many firms have teleprocessing fever. Clamouring for more batch and on-line terminals to facilitate fast communication and feedback with remote sites, manufacturers are moving to give the user what he wants. Also, as small businesses adjust to the concept of EDP, they then want terminals to add to their system.

Table 23 shows a breakout of the revenue contributions of the two major forces in the independent market -- OEM and End-User. IDC has defined the End-User portion to be all manufacturers, including PCM, who sell to the final consumer. The table shows the OEM portion of revenues to be declining on a percentage basis. However, the dollar compounded rate of growth for the sector over the next five years is expected to be about 12%. In contrast, the End-User slice of the total revenue pie has been increasing with their rate of compounded growth expected to be 17% over the next five years.

TABLE 23

INDEPENDENT PERIPHERAL MARKET -- OEM/END USER REVENUE BREAKOUT

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Total Revenues	$880M	$1,235M	$1,685M	$2,280M	$2,950M	$3,375M	$4,000M	$4,900M	$6,000M	$7,250M	$8,500M	$9,775M
% OEM	64%	53%	43%	44%	44%	43%	43%	45%	45%	43%	41%	40%
OEM Revenues	$563M	$ 655M	$ 725M	$1,003M	$1,298M	$1,451M	$1,720M	$2,205M	$2,700M	$3,117M	$3,485M	$3,910M
%Δ		16%	11%	38%	29%	12%	19%	28%	22%	15%	12%	12%
% End-User	36%	47%	57%	56%	56%	57%	57%	55%	55%	57%	59%	60%
End User Revenues	$317M	$ 580M	$ 960M	$1,277M	$1,652M	$1,924M	$2,280M	$2,695M	$3,300M	$4,133M	$5,015M	$5,865M
%Δ		83%	66%	33%	29%	16%	19%	18%	22%	25%	21%	17%

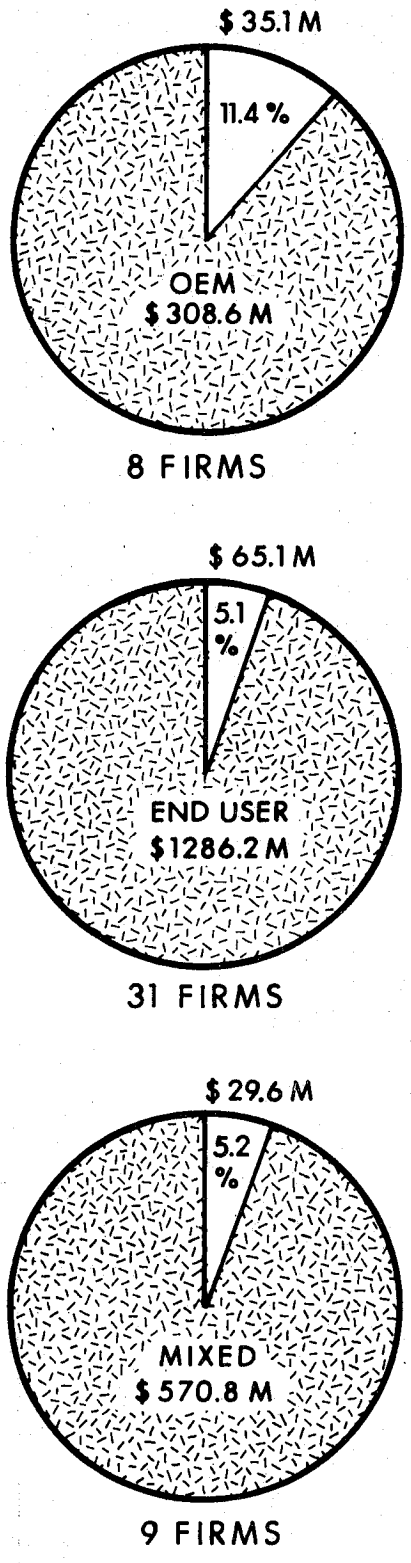


Figure 12 1976/77 PROFITABILITY OF OEM, END-USER, AND MIXED MARKETING APPROACHES

lease bases to be hard to obtain puts them in a precarious position. This year's examination of the PCM suppliers in KEYS shows them to be improving on a % profit basis and also notes that the majority of participants do not depend upon PCMS as their sole source of income and are into balancing businesses.

U.S. PCM Market

The most heavily marketed of the PCM products are the disk, tape, and memory products. Their competitive status i.e., plug-compatible rather than unique influences their profitability as was demonstrated by the first section of the report. IDC has taken their examination one step further and has looked at the market share of the independents in each product area. Table 24 illustrates:

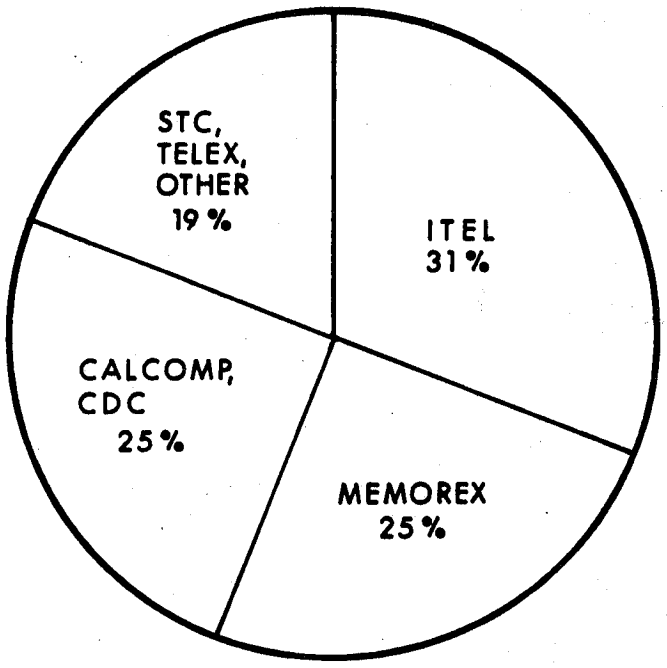
- Independents have about a 37% share of the 3330 disk drive market with 22,000 in use at 12/76. Most have been shown to be in a transitional stage i.e., they are still heavily shipping 3330s while launching their initial attack on the 3350 market.
- A 34% share of the tape drive market for independents with 15,750 installed, and STC leading the market.
- The add-on memory market is valued at about $710 million with a 35% market share. (Measured at IBM's list price and does not reflect the revenues of the individual companies.) AMS is the undisputed leader.

Figure 13 and 14 breakout the PCM 3330 and 3420 markets by independent manufacturers market shares. And Figure 15 breaks out add-on memory market.

TABLE 24

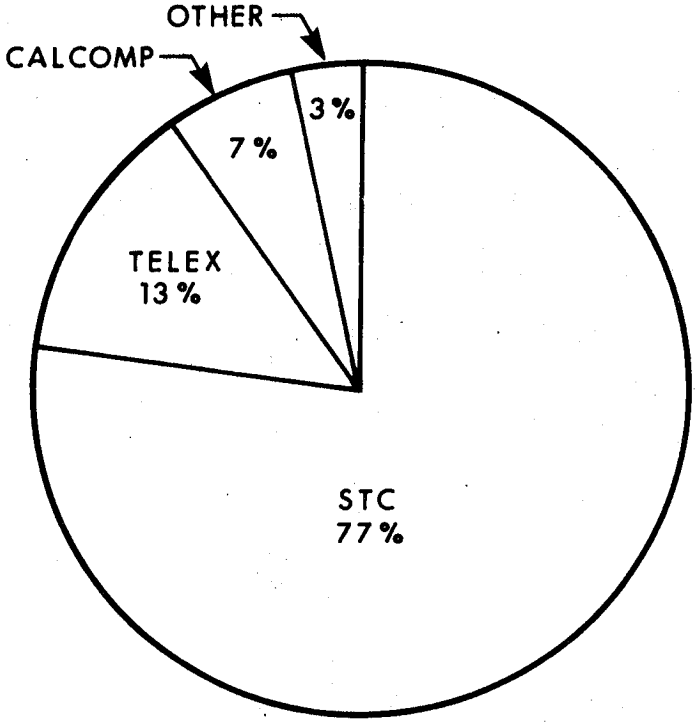
U.S. PCM MARKET -- 1976/77

Product	Amount in Use	PCM Penetration
3330 Spindles	22,000 (PCM)	37%
3420 Drives	15,750 (PCM)	34%
Add-On Memory - 370	$710 million	35%



3330 DISK DRIVES

Figure 13 3330 PCM MARKET SHARES - 1976/77



3420 TAPE DRIVES

Figure 14 3420 PCM MARKET SHARES - 1976/77

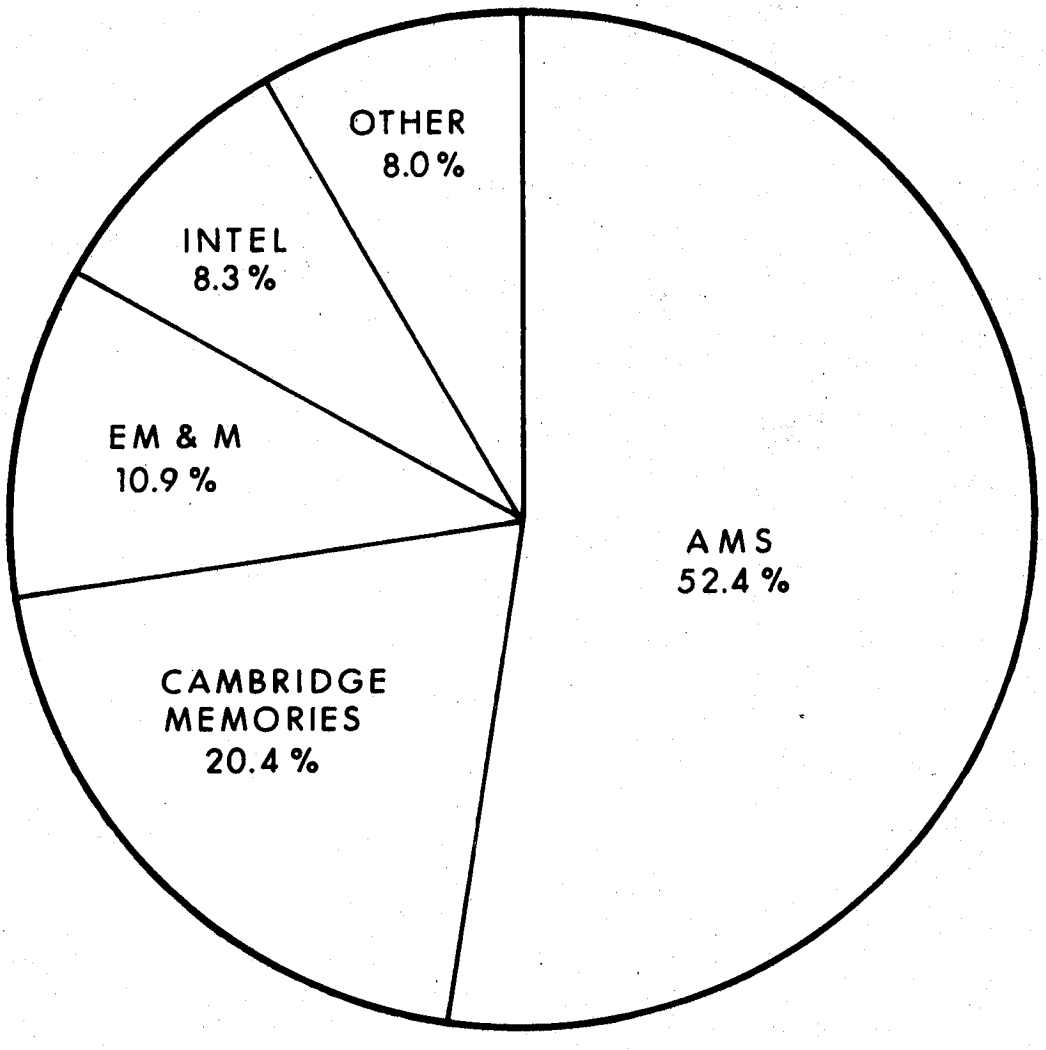


Figure 15 ADD-ON MEMORY PCM MANUFACTURERS MARKET SHARES - 1976/77
(SYSTEM 370 ONLY)

Solution-Oriented Product Manufacturers

Most manufacturers fitting this marketing category manufacture keyboard products. As noted previously, the keyboard market constitutes one of the most dynamic market sectors, and is expected to experience a compounded rate of growth of 11% over the next five years. 1972 was the springboard year for this sector as key-to-disk and intelligent terminal revenues started to rise.

Revenue activity in the keyboard market between 1971 and 1976 is depicted in Figure 16. At yearend 1976, there were 1,436,000 keyboard products in the U.S., 42% of which were manufacturered by independent manufacturers. Their market share as compared to other competitors is illustrated in Figure 17. By 1981, we estimate that there will be about 2,856,000 keyboards installed in the U.S., with the independents share continuing to grow at the expense of IBM. Although IBM is expected to be more aggressive in the teleprocessing area since its announcement of SNA, it has still been the independents who have been the most innovative and far-thinking in terms of bringing out products to meet the trends and demands of the marketplace. AT & T could offer strong competition if given a clear go ahead to participate fully in the data communication terminal market, but its impact without that mandate is uncertain.

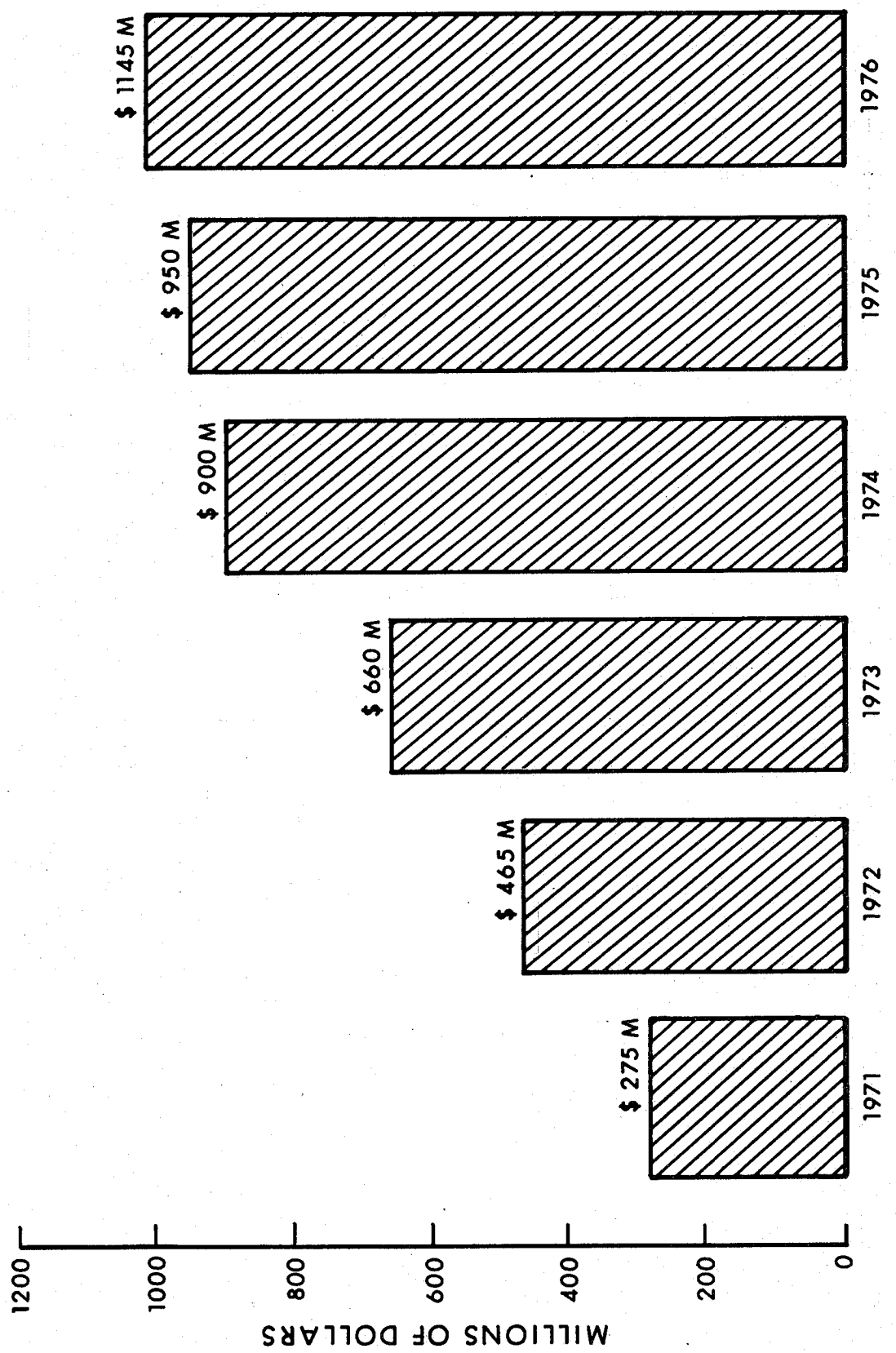


Figure 16 INDEPENDENT PERIPHERAL KEYBOARD SUPPLIERS TOTAL REVENUES – 1971-1976

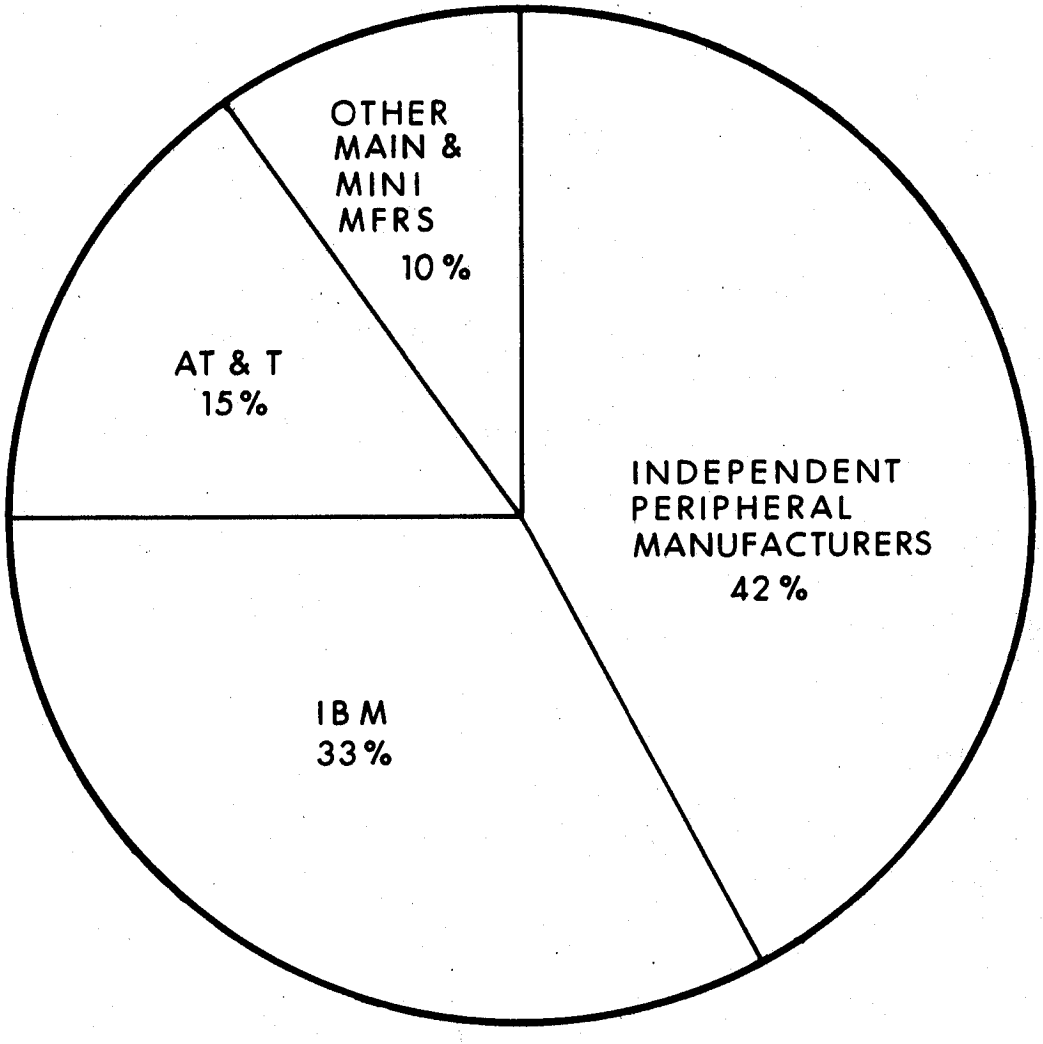


Figure 17 U.S. KEYBOARD MARKET
MARKET SHARES - 1976

Product Sector Revenue Review

In addition to comparing firms on the basis of general marketing approach and industry sector, IDC has also compared them on the basis of product sector in a much broader manner. Figure 18 illustrates the product contribution on a % basis at the stop-points 1971, 1976, and 1981. A comparison of the bar graphs yields evidence of the decline and growth of various products i.e.:

- The "Other" category which in 1971 consisted primarily of card readers and paper tape readers has declined considerably from 1971's 14% to 1976's 6% with it expected to continue to decline to just 4% of the market by 1981.
- Keyboard and Disk/Tape markets are expected to hold an equal share of the market by 1981.

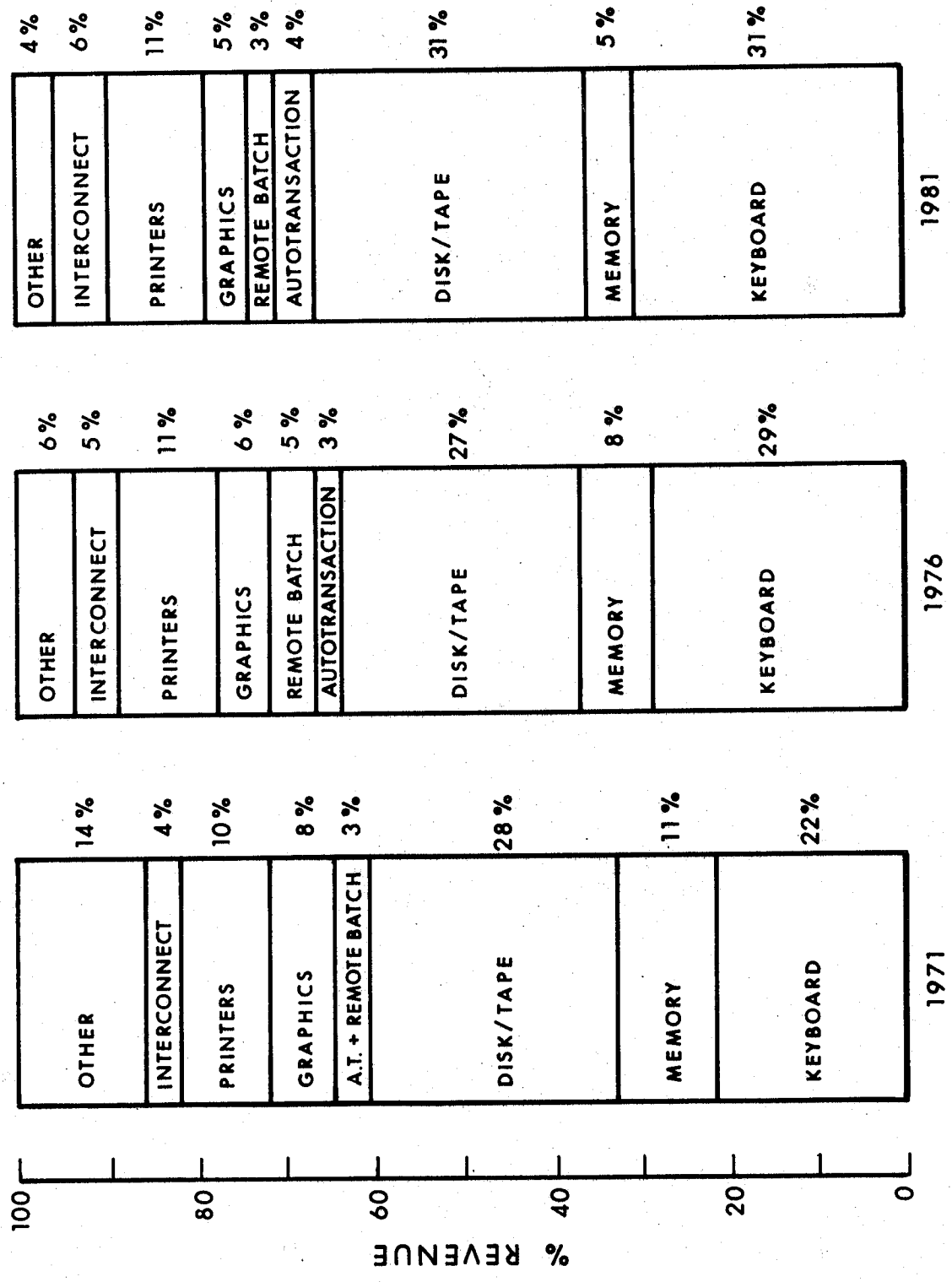


Figure 18 INDEPENDENT PERIPHERAL MARKET - 1971, 1976, 1981
% REVENUE BY SECTORS

Overview

As illustrated in Table 25, total revenue by product sector will not change to any great degree, although overall revenue dollars will increase 144%.

TABLE 25

REVENUE GROWTH -- INDEPENDENT PERIPHERAL MANUFACTURERS
1976-1981
(Millions of Dollars)

	1976 Revenues	% Total	5 Year Compound Rate of Growth	1981 Revenues	% Total
Keyboard	$1,145	29%	21%	$2,990	31%
Disk/Tape	1,080	27	23	3,030	31
Printers	425	11	20	1,050	11
Memory	300	8	13	550	5
Graphics	230	6	15	460	5
Remote-Batch	210	5	9	325	3
Autotransaction	135	3	26	420	4
Interconnect	210	5	23	600	6
Character Recog.	150	4	11	250	3
Other	115	2	-	100	1
TOTAL	$4,000	100%	20%	$9,775	100%